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# Mimimum Wage For Industry Looms

## Wage and Hour Division, Department of Labor, Announces Appointment of Committee Headed By John A. Lapp To Recommend Minimum Wages For Paper Industry — First Meeting In March.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., Feb 28, 1940—Appointment of a committee to recommend minimum wages for the paper industry has been announced by the Wage and Hour Division, Department of Labor. John A. Lapp, Chicago publicist and educator, is chairman of the committee.

The chairman has arranged the first meeting of the committee for March 18 in Washington. The committee does not plan to call witnesses at this meeting.

The committee will investigate economic and competitive conditions in the industry as defined which includes the manufacture of pulp paper and press board but does not include the making of converted paper products, bags, boxes, etc. Manufacture of such products will be studied by later committees. The industry as defined employs about 150,000 wage earners. It is estimated that between ten and twelve thousand of these workers are paid less than 40 cents an hour, the highest minimum the committee can recommend.

The industry is carried on in about 750 establishments and its total annual production is valued at about one billion dollars.

### Personnel of Committee

The committee has 18 members, equally representative of the employers, the employees and the public. The public membership, in addition to the chairman, is comprised of Henry A. Grady of Newberne, North Carolina, former Superior Court Judge of that state; Wayne Lyman Morse, Dean of the Law School, University of Oregon; Eugene, Oregon; Colonel William J. Wilgus, Director of Military Railways for the United States Army in France during the war; Mrs. Elizabeth Brandeis Raushenbush, economist of the University of Wisconsin; and Sumner H. Slichter, economist of Harvard University.

The employer membership of the committee is comprised of W. J. Alford of the Continental Paper Company, Ridgefield Park, New Jersey; G. Alan Goldsmith of the Mead Corporation, Chillicothe, Ohio; Stuart E. Kay of the International Paper Company, New York; L. J. Parant, St. Croix Paper Company, Woodland, Maine; Dwight Stocker of the Michigan Paper Company, Plainwell, Michigan; and David J. Zellerbach of the Crown Zellerbach Corporation, San Francisco.

### Employee Membership of Committee

The employee membership of the committee is: Frank P. Barry, Albany, New York; Charles O. Dunton, Rumford, Maine; Maxwell Loomis, Port Townsend, Washington; Paul Phillips, Mobile, Alabama; H. W. Sullivan, Washington, D. C.; all of the International Brotherhood of Paper Makers (A. F. of L.); and Ray Thomason, Richmond, Virginia, of the Virginia Industrial Union Council, C. I. O.

In accordance with the directions of the Fair Labor Standards Act, the committee has been appointed with due regard to the geographical regions in which the industry is carried on.

Any recommendation made by the committee will be the subject of a public hearing before the Administrator or his representative at which interested persons may appear in support or opposition.

### Paper and Pulp Industry Defined

The industry has been defined for the committee in this manner:

"The term 'pulp and primary paper industry' means the manufacture of pulp for any purpose, from fibrous material capable of yielding cellulose fibre and the manufacture of Paper and of Board from such pulp and from such fibrous material or either of them with or without addition of any non-cellulose fibre, colorant or filler.

"The term 'manufacture' as used in this order means all operations involved in the production of pulp, paper, and board, starting with the unloading of raw materials at the mill site and ending with the delivery of the finished paper or board to carriers for sale as such or to converting departments within the same mill or company. It includes finishing oper-

*(Continued on page 14)*

# Growth of Paper Industry Predicted

## R. A. McInnis, Former President of Canadian Pulp & Paper Association Bases Optimistic Forecast of Future On Large and Increasing Consumption of Wood Pulp, Paper and Paper Products — Other Industrial News.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., February 26, 1940—That the pulp and paper industry is now well launched on long-term progress and expansion, quite irrespective of such temporary increase in activity as may result from the conflict, is the opinion expressed by R. A. McInnis, general manager of the Anglo-Canadian Pulp and Paper Mills, Quebec, and for four years president of the Canadian Pulp and Paper Association.

### World-Wide Consumption Increasing

Mr. McInnis bases his optimistic outlook on the fact that not only is there a large and increasing consumption of paper and paper products throughout the world, but that wood pulp is becoming the raw material for the manufacture of an infinite variety of products outside the paper field. These considerations and the fact that Canada has the largest area in the world today of commercial timber that is suitable for the purposes to which wood pulp is being put, leads him to the conclusion that the industry's greatest period of development, as far as Canada is concerned, lies ahead.

### Outside Consumers Look to Canada

That outside consumers, both on this continent and overseas, will come to look increasingly to Canada for newsprint is one of his convictions. He bases this on the fact that the producers of many of the European countries have been finding a more profitable and more expansive market to supply pulp for the increasing demands of paper products other than newsprint or for the manufacture of those same products.

In the use of Canadian pulp for the manufacture of such other products, both for domestic consumption and for exports, he also sees great opportunities, estimating that in board products alone Canadian mills will reach a production of 1,000,000 annually within the next two decades. He also believes that existing and increasing American demands in respect to pulp products open up an important field for the supply of Canadian pulp.

To make the most of these opportunities he advocates expanding and directing research; attaining a well-informed public opinion of the industry; and working in co-operation with the various governments.

### Honor for Brig.-Gen. White

Brigadier-general J. B. White, D.L.O., G.D., vice-president of the Canadian International Paper Company, has been elected a director of Allied Investment Corporation (Canada), succeeding the late Julian C. Smith, former president of the Shawinigan Water and Power Company.

### Donnacona Company Expanding

The Donnacona Paper Company is extending its sulphite pulp plant with a view to increasing its production by 1,000 tons monthly, and it is said the company may sell as much as 23,000 tons of unbleached sulphite in the United States this year. The present capacity of the company's plant is: 550,000 lbs. of newsprint per day; 150,000 square feet of fiber board; 630,000 lbs. of ground wood; and 200,000 lbs. of unbleached sulphite fiber.

## Government Paper Bids and Awards

WASHINGTON, D. C., February 28, 1940—R. P. Andrews Paper Company has been awarded the contract for furnishing the Government Printing Office with 10,000 pounds of 21x32 and the same quantity of 38x38 chemical wood manila paper at 5.5 cents, bids for which were received on February 9.

Other paper awards announced include:

Tarentum Paper Mills will furnish 996 pounds (2,600 sheets) of 30x34½ M.F. red sulphite paper at 8.95 cents and Mudge Paper Company will furnish 28,000 pounds (1,000,000 sheets) of 50 per cent rag, 10½x16 white M.F. lithograph paper at 9.04 cents. Bids for both of these items were received on February 7.

Resolute Paper Products Corporation will furnish 10,000 pounds of No. 1 gummed kraft paper in 24-inch rolls at 8.125 cents, bids for which were received on February 5.

Whitaker Paper Company will furnish 1,500 pounds (46,000 sheets) of 24x38—32, white paraffin paper at 10.17 cents, bids for which were received on January 31.

Barton, Duer & Koch Paper Company will furnish 1,376 pounds (8,600 sheets) of 25x38 ivory laid antique paper at 3.5 cents, bids for which were received on January 29.

R. P. Andrews Paper Company will furnish 244,214 pounds of various sizes hard rolled binders board, at 4.785 cents, bids for which were received on January 26.

The Printing Office has received the following bids for 106,200 pounds (1,180,000 pounds) of 27½x39 M.F. book paper; R. P. Andrews Paper Company, 5.77 cents; Mudge Paper Company, 5.28 cents; Perkins-Goodwin Company, 5.74 cents; Cauthorne Paper Company, Inc., 5.62 cents; Whitaker Paper Company, 5.78 cents; Fitchburg Paper Company, 5.16 cents; Stanford Paper Company, 5.76 cents; Barton, Duer & Koch Paper Company, 5.71 cents; Paper Corp. of U. S., 5.375 cents; and Marquette Paper Company, 5.73 cents.

For 10,000 sheets of 22x28 gray photo mount board; R. P. Andrews Paper Company, $34.15 per M sheets; Mathers-Lamm Paper Company, $33.15; Mudge Paper Company, $35.34; Whitaker Paper Company, $32.69; Old Dominion Paper Company, $33.98; Charles G. Stott & Company, Inc., $35.85; Hurlock Bros. Company, $34.60 less 2 per cent; M. S. Ginn & Company, $34.35 less 2 per cent; and Charles W. Speidel & Company, $34.40 less 1 per cent.

# Scott Acquires More Brunswick Stock

## Individual Holdings of Scott Paper Company and Mead Corporation Each Increased By Purchase of 500 Additional Shares of Capital Stock of Brunswick Pulp & Paper Co.—Scott Earnings At New High Level.

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., February 26, 1940—In his annual message, president Thomas B. McCabe stated that during 1939 the Scott Paper Company and the Mead Corporation each purchased 500 additional shares of the capital stock of the Brunswick Pulp and Paper Company at $100 per share, increasing their individual holdings in the capital stock of that company to $770,000. In November, the Scott Paper Company and the Mead Corporation each subscribed for 2,000 additional shares at $100 per share, to be paid for in 1940 as required at Brunswick, for the purpose of financing an increase in the plant's rated capacity from 150 tons to approximately 200 tons daily. The work is scheduled to require six months for completion at an estimated cost of $500,000, of which approximately $100,000 will be provided from the Pulp Company's earnings.

### Future Pulp Requirements Assured

"At present", continued Mr. McCabe, "95 per cent of your Company's estimated pulp requirements for 1940 is now on hand, in transit, or covered by contracts with Canadian and American suppliers. Therefore, your Company is not seriously concerned about its foreign pulp supply for 1940 except as it may affect the pulp inventory for 1941. If the European conflict continues until 1941, then shipments under foreign contracts may be further curtailed. With this in view, your company has been successfully developing American sources of supply, and the proportion of foreign pulp required is constantly diminishing.

### Changes in Manufacturing Plant

Significant changes in the manufacturing plant in Chester included the complete installation of a new paper-making unit in January and another in November. Other accomplishments include a major rebuilding program involving two other paper-making machines, additions and improvements to the power plant, and construction of a new filter plant. Total additions for the year were approximately $2,900,000.

### Net Sales at New High Level

Net sales continued to increase in 1939 and attained a new high record of $18,516,000, an increase of 14.5 per cent over the previous year. Manufacturing operations were maintained at capacity and during the year additions and changes to the Chester plant were made requiring total capital additions of approximately $2,900,000.

On January 1, 1939, $2,812,000 principal amount of the company's 3¼ per cent debenture bonds was outstanding. Partial calls for redemption of these bonds were made during the year and on December 18th, the entire principal amount of bonds then outstanding was called for redemption on February 5, 1940. As of that redemption date all the bonds were converted or retired and the company is now without funded debt.

### Scott Earned $2.65 Per Share in 1939

The Scott Paper Company reports for the year 1939 net earnings for common shares of $1,736,093, an increase of $356,143 over the previous year. Per share earnings calculated on the 653,391 shares outstanding December 31, 1939 were $2.65 as compared with $2.11 in 1938 on the same basis.

Quarterly dividends of 40 cents per share were paid on the common shares in 1939 with an extra payment of 25 cents in the final quarter, totaling $185 per share for the year compared with $1.80 per share in 1938. Net earnings of $563,738 were transferred to surplus account.

### Dividend of 40 Cents Just Declared

The Board of Directors of Scott Paper Company has declared a quarterly dividend of forty cents per share on the company's common shares, payable March 15, 1940 to shareholders of record March 1, 1940. Also the regular quarterly dividend of $1.12½ per share on the company's cumulative preferred shares, and the regular quarterly dividend of $1.00 per share on its $4.00 cumulative preferred shares, both payable May 1, 1940 to holders of record April 20, 1940.

### Paper and Cordage Association Add Members

The Philadelphia Paper and Cordage Association, at their February meeting, added four new members to their rapidly growing list of members. This unique organization, now numbers among its members practically every paper house, twine house, converter and mill representative operating in the Philadelphia area, and president, George K. Hooper and membership chairman Jack Howarth are determined to include every worthwhile company by the end of the year.

### Paper Merchants, Inc. Elect

At the annual meeting of Paper Merchants, Inc., held during the month, the following were elected for the ensuing year: Winfield Predmore, president and treasurer; J. G. Seckel, vice-president and secretary; Ormond Freile, vice-president; F. C. Van Gilden, assistant-secretary, and C. A. Harrison, assistant-treasurer.

Vice-president Freile stated that business thus far this year has been very good, and is considerably better compared with a like period last year. Paper Merchants, Inc. announce the addition of L. L. Brown's 50 per cent rag paper Escort Ledger to their already extensive lines.

## John F. Blackman Convalescing

BOSTON, Mass., February 26, 1940—John F. Blackman, vice-president of D. F. Munroe Company and president of the New England Paper Merchants Association, who recently underwent an operation, is doing well. Mr. Blackman was stricken with an attack of acute appendicitis Saturday afternoon, February 17.

# Canadian Timber Probe Under Criticism

## Evidence Given By Mayor of Port Arthur At Meeting of Timber Probe Committee of Ontario Legislature Arouses Some Dissension—Ontario Expects Pulp and Paper Markets Will Expand — Other Industrial News.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ontario, February 26, 1940—Before the timber probe committee of the Ontario Legislature, which has held several sessions, Hon. C. W. Cox, Mayor of Port Arthur, gave evidence which aroused sharp criticism from Hon. Peter Heenan, Minister of Lands and Forests, and E. E. Johnson, of Fort Williams, president of the Pigeon Timber Company who is a widely known lumberman and an extensive dealer and operator in pulpwood. Mr. Johnson showed by means of graphs and charts how competition from Scanadinavian countries had cut into Canada's export business in pulp. Where Canada formerly supplied 95 per cent of the quantity imported by the United States, Mr. Johnson said that it now only supplied 29 per cent. He added that Sweden and Finland can lay down bleached kraft pulp at $29 a ton f.o.b., Green Bay, Wisconsin. The best that could be done in Canada was $41 a ton. High speed production at low cost both in the Scandinavian countries and in the United States was putting Canadian mills at a serious disadvantage. Most mills in Canada were, Mr. Johnson said, operating with old equipment, that lacked the efficiency of new machinery.

### Calls Long Lac Project Practical

Turning to the Long Lac Diversion project in the Thunder Bay district and the operations of the Pulpwood Supply Company, Mr. Johnson remarked that the scheme was highly practical. It might be expensive for the first two or three years but would work out fully as well as the promoters had hoped. The first drive down the canal had been successful and 30,000 cords had been taken through. There was reason to believe that the task would be easier as time went on and the water course more definitely established.

Hon. Peter Heenan, Minister of Lands and Forests, said that he would table a letter showing that Mr. Cox supported the defunct Lake Sulphite Pulp Company promotion and the Long Lac Diversion scheme which he had criticized and that he (Cox) was the greatest advocate of pulpwood export from the start, claiming all the credit for having the embargo lifted by the province of Ontario.

Mr. Johnson termed statements made by Mr. Cox as "false and malicious" and that the onslaught had been made by Cox for the deliberate purpose of eliminating a competitor. Mr. Johnson who is chairman of the Fort William Industrial Committee, upheld the policy of the Ontario government both as regards export of pulpwood and the allocation of timber limits to various companies.

### Ontario Expects to Expand Pulp Markets

In his Budget address before the Ontario Legislature, Hon. Mitchell Hepburn, Premier of the province, said that the loss of Scandinavian trade with the United States would afford Ontario an opportunity of gaining additional markets for its pulp and paper. He said that the uncertain condition of Europe during the year 1938 and the greater part of the following year caused grave apprehension in the forest products industry of Canada and adversely affected prospective undertakings in the province of Ontario. He added that the declaration of war, with consequent disturbance in the economic field, may have an important reaction on the pulp and paper business of Ontario. Although there have been several governmental restrictions placed upon the use of newsprint in the United Kingdom which will affect Canadian export, it is predicted that the loss of the Scandinavian trade with the United States will afford Ontario an opportunity.

### Exports of Peeled Pulpwood Permitted

A bill has just been passed in the Ontario Legislature permitting the exportation of peeled spruce pulpwood. The bill was endorsed by the Committee of the Legislature inquiring into the administration of the Department of Lands and Forests. It appears at the turn of the century substantial land grants were voted by the Legislature pursuant to several special acts to railway companies in consideration of the completion of the undertakings they had in hand. Under the provisions, of such Acts, however, certain restrictions were placed upon the timber growing on such lands and amongst others the exportation of spruce pulpwood was prohibited. This restriction has continued in existence for the past forty years. The bill just passed will have the effect of putting the spruce pulpwood found on such lands in almost the same position as spruce pulpwood growing on Crown lands namely, that if permission is granted by the Lieutenant-Governor-in-Council it may be exported after it has been peeled upon such terms and conditions as may be prescribed.

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## Thermometer of Paper

A new chemically-treated paper called "Sure-Temp" which changes from white to deep blue in color when the temperature rises above a certain point, is an inexpensive, convenient replacement for more expensive and damageable pyrometers and steam pressure gauges. The paper has an opaque white coating of a material which melts sharply at a definite temperature, indicating positively by change in color that the surface with which the paper is in contact has reached that degree of heat. It can be made for controlling many temperature limits.

Designed originally for use in laundries, it is finding wide application wherever efficiency depends upon a limit of temperature. "Sure-Temp" is manufactured by the Nashua Gummed And Coated Paper Company of Nashua, New Hampshire.

# Southern Pulpwood Conservation Association Holds Annual Meeting

The Southern Pulpwood Conservation Association held its first annual meeting on January 18-19 at the Ansley Hotel, Atlanta, Ga. The morning session January 18 was an open one to which were invited the public foresters, federal and state, from the association's territory, Virginia to Arkansas and Texas inclusive. There were fifty-three present at the meeting. Thirteen of the 17 member companies were represented, the number of representatives from each company ranging from one to eleven. Representatives of the U. S. Forest Service from Regions 7 and 8 and the Southern Forest Experiment Station in New Orleans, and representatives from 9 of the 11 State Forest Services in the Association's territory were also present.

The meeting in conjunction with the public foresters was planned in order that the association might benefit by the criticisms and suggestions for improvement in its conservation program offered by these officials. It was decided to hold at least one meeting each year with the public foresters.

All of the public foresters said they had been watching with great interest the work of the association, since its voluntary self-regulation was considered the most outstanding step in conservation ever taken in the South by a wood using industry. They agreed that progress had been made during the first year of the association's existence and thought now the time had come for the standards of the cutting practices to be raised.

### J. H. Allen Speaks

J. H. Allen, president of the Southern Pulpwood Conservation Association delivered a forceful address, excerpts from which follow: "The year just past will no doubt prove to be the most hazardous year of the association, for we have had to consolidate our ideas. We seem to have crystalized our purposes, consolidated our management ideas, and now stand on our own feet as the very definite representatives of commercial forestry in the South as forestry is related to the conservation of pulpwood timber.

"We are engaged in a preachment that will require time for the public to accept, adopt, and practice. We know that fire protection and selective cutting constitute the prerequisites of any successful forest conservation program. We would like to force these practices into use by all forest products companies, all timber landowners, contractors, railroads, and others. This we are trying to do. Let us not be discouraged if results come slowly.

"To induce others to adopt our forestry we must excite in them that which our companies possess—the profit motive. The profit motive will keep the paper companies on the team of forestry now and forever. Utilization constitutes the very heart of forestry.

"The Federal and State Governments should never undertake to do away with free trade and barter for timber or timber lands. That would be a major movement in the direction of Germany and Russia. The states should be awakened to the importance of 'State Forestry.'

"Both the State and Federal Forest Service are far ahead of us just now in practical usefulness and I urge that we have the closest possible co-operation with them and I ask that the Departments give full consideration to the benefits our members have brought to Southern forestry through this great utilization program now actually going on. It is only through the most understanding and tolerant co-operation that we can do the job. We now have three organizations that desire to bring about the same results, the machinery has been set up to do the job. Let us will to do the job together and with all the wisdom we possess.

"In the area from Norfolk, Va. to Mobile, Ala., and inland 175 miles there are in my opinion better than 50,000,000 acres of pine lands that will raise now better than 16,000,000 cords of pulpwood annually. The present pulpwood drain in the area is less than 3,000,000 cords. The present capital stand in my opinion is better than three cords per acre or 150,000,000 cords. It is quite evident that by improved forest management there can be no timber famine, but without good forest management there will be. Forest management will improve now that a demand for timber has come, and because it will pay to conserve the small trees that come up naturally and free of cost to the land owner."

### Conservation Program Discussed

The afternoon meeting was a closed session at which the members of the Southern Pulpwood Conservation Association discussed their conservation program.

The association decided to adopt the use of seed tree tags. These tags will be placed on trees left for reseeding purposes. An inscription stating that "this tree has been left for seed" signed by the Southern Pulpwood Conservation Association and by the individual member mill which places the tag will carry a conservation message not only to pulpwood producers and landowners, but to countless other individuals in the community, and it is hoped will further the conservation program in the South.

At 7 o'clock on the evening of January 18 the Southern Pulpwood Conservation Association gave a very enjoyable informal banquet at the Ansley Hotel. All of those who had attended the meetings and a few special guests were present. The tables were attractively decorated in a woodland motif and at the conclusion of the dinner a feature of unusual interest was presented. This was the showing of a special film made by Mr. Davis of the U. S. Forest Service and Mr. Heyward, general manager of the Southern Pulpwood Conservation Association. It pictured the selective cuttings being practiced by Southern Kraft Corporation in the vicinity of its Georgetown, S. C. mill. This work is so outstanding that it has won acclaim from all foresters who have visited the operation. Southern Kraft is marking timber to be

cut on non-company lands in the Georgetown vicinity gratis—thus giving the landowners the benefit of technical management of their timber lands and at the same time building up tracts of timber that will have a sustained yield. It was very stimulating to members of the association to see not only what *can* be done—but what actually *is* being done towards conservation of forest resources.

### Officers and Directors

The morning of January 19 was devoted to the regular business session of the association. The following is the list of directors and officers elected for 1940: President, J. H. Allen; Executive Vice-president, C. O. Brown; Executive Committee: J. H. Allen, C. O. Brown, E. A. Sterling, C. E. Smith, A. H. Stier. North Carolina: T. W. Earle, Hugh Camp. South Carolina: W. D. Comings, C. P. Cuthbert. Georgia: A. H. Stier, M. S. Kahler. Florida: R. H. Laftman, W. T. Edwards. Alabama: W. E. Penfield, H. S. Galloway. Mississippi: P. M. Garrison, P. N. Howell. Louisiana: C. O. Brown, G. T. Madison. Arkansas: J. E. McCaffrey, Earl Porter. Texas: C. E. Smith, E. J. Downey. Tennessee: E. A. Sterling, W. J. Damtoft. Virginia: W. L. Gooch, R. F. Bower. At large: W. G. Schwab and E. L. Kurth.

## New Adhesive for Paper Products

Paisley Products, Inc., 1770 Canalport avenue, Chicago, Ill. and 630 W. 51st street, New York City, announces that following exhaustive tests, its new printers and book-binders paste No. 396 is now being placed on the market.

It is claimed this new paste will adhere all grades of paper stock to chip and binder's board without wrinkling or warping. This feature is explained by its ability to stay on the surface of the paper, preventing saturation of the board with excess moisture. Because of this quality it is claimed extra coverage or mileage is obtained as a thinner film of the paste can be applied without sacrifice of adhesive qualities.

According to the announcement the new paste can be applied in the usual manners, by hand brushing or machine, and is designed with a long working range permitting operator to lay out considerable work at one time thus affording increased production.

Although primarily intended for printer's bindery shops, publishers, book-binders, the lay-flat nature and adhesive strength of this new paste has created interest among all users and converters of paper and paper board products, according to the manufacturer.

## MINIMUM WAGE LOOMS

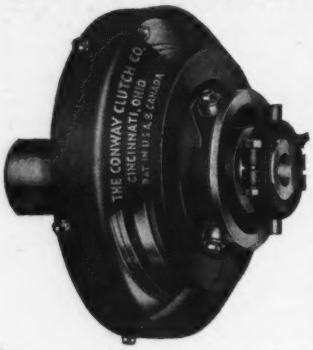
*(Continued from page 9)*

ations normally performed in the paper or board mill, such as packing, trimming, cutting to size, sorting, plating, sizing, super-calendering, and other processing, but does not include any treating processing or refabrication of finished paper or board to produce converted paper or board products.

"The definition of the pulp and primary paper industry covers all occupations in the industry which are necessary to the production of the articles specified in the definition, including clerical, maintenance, shipping and selling occupations."

## Conway Release Clutches

Conway overload release clutches, Series 650, manufactured by The Conway Clutch Company, 1543 Queen City avenue, Cincinnati, O., are described in Bulletin S-10 issued by the company. This type of clutch is designed to function in transmitting power as the fuse does in the transmission of electrical current. It can be set to transmit any torque from zero to its rated capacity and will keep this setting even after adjustment for wear is made.




This type of clutch functions by engagement in the regular manner of all Conway disc clutches and smoothly transmits its load, until an obstruction or excessive torque is encountered. The clutch then slips, and after slipping one-half revolution, it automatically disengages itself. If desired, it can also operate a limit switch and disconnect electrical equipment. When the excessive torque is removed, the clutch can be engaged again and production resumed as before. Bulletin S-10 giving dimensions and list prices of this and other Conway clutches may be obtained from the company on request.

## Strike Closes Moyer & Pratt Mill

LYONSDALE, N. Y., February 24, 1940—The Moyer & Pratt Paper Company was forced to suspend operations early last week because of labor troubles. The management ordered the shutdown after employees staged a walkout when their demands were not met. Officials refused to make any statement but the company has always had the interest of employees in mind and an early adjustment is expected. From reliable sources it was learned that 66 of the 80 employees had joined the A. F. of L. local which was organized here this winter with John Burke as president. In December the wages of common labor were raised from 49 to 52 cents per hour for a 42 hour week with a corresponding increase along the scale. It is understood that the company recently refused an offer to sell the mill when assurance that employees would be retained by the new management was not obtained. Although no trouble is expected from the idle workers it is believed that several weeks will elapse before a satisfactory settlement is reached. It was also stated that the A. F. of L. has promised to take care of the striking men during the adjustment period at a reduced wage rate.

## Brown Co. to Ship Pulp to Japan

The Brown Company has received a "substantial" order for pulp from Japan, according to Henry T. Carruth, general manager. This order will permit resumption of shipments to that country after a lapse of 14 months. Although the exact amount is not stated, it is understood that the order calls for several thousand tons, shipment of which will start in the second quarter this year.

# Obituary

### George F. Perkins

JERSEY CITY, N. J., February 26, 1940—George F. Perkins, paper manufacturer and banker, died here February 22 at his home, 2600 Hudson Blvd. at the age of 66.

A native of Jersey City, Mr. Perkins joined his father in the Perkins-Goodwin Company, of which the elder Perkins was vice-president, and after his death organized Perkins & Squier, a New York paper manufacturing firm. He was president till his retirement three years ago.

For 18 years Mr. Perkins was vice president of the Provident Institution for Savings, and was also a director of the Colonial Life Insurance Company.

During the World War he was a major with the Quartermaster Corps, later being promoted to lieutenant colonel. He also had been a captain in the old Signal Corps of the New Jersey National Guard.

In recent years he had lived much of the time on his 500-acre estate in Lee, Mass.

Mr. Perkins is survived by his wife, Louise; a son, George F. Perkins 3d of Short Hills; a daughter, Mrs. Robbins Miller, of New Haven, and a sister, Mrs. A. W. Ready of Jersey City.

### Charles H. Hornbeck

Charles H. Hornbeck, associated with the paper industry most of his life, died yesterday at the age of 71 in Appleton, Wis. He was superintendent of the Frank Gilbert Paper Company, Waterford, N. Y., 1894-1912, and superintendent of the Atlas Paper Company, Skaneateles, N. Y., in 1913. From 1913-29 he was associated with the Kimberly-Clark Corporation as superintendent and manager of the Atlas Mills at Appleton and Neenah Mills, Wis.

### Fred Kautz

EVANSVILLE, Ind., February 26, 1940—Fred Kautz, 89 years old, a pioneer in the wholesale paper business here, died late last week after an illness of two weeks. Born in Germany, he was brought to this country when two years old. He married in 1875 and moved from Cincinnati here when he established his wholesale business. He retired some years ago after selling the business to Wilhelm Kreyling. Four daughters survive.

### Herbert W. Robbins

BOSTON, Mass., February 26, 1940—Herbert W. Robbins, 65, widely known in the New England paper trade, passed away February 24 at his home, 73 Kemper street, Wollanston, Mass.

Born in Somerville, he entered the employ of Hallet Brothers Company, Boston paper manufacturers, as a young man, and became president of the firm in 1916. In 1927, he founded the Robbins Paper Company in Boston and served as treasurer and chairman of the board of directors.

He was a life member and former commodore of the Quincy Yacht Club, and a charter member of Stoney Brae Golf Club. He was a member of the Boston Paper Trade Association and the New England Paper Merchants Association, past president of the Neighborhood Club of Quincy and also held membership in Mt. Ida council, Royal Arcanum, of Newton, Mass.

A widow, Mrs. Ethel Hawkins Robbins; a sister, Miss Grace H. Robbins of Melrose, Mass., and a brother, Walter M. Robbins of Lakeland, Fla., are living.

Funeral services were held at 2:30 February 27, at the Forest Hills crematory chapel.

## New Literature

A line of thermometers and pressure gauges is described in a booklet issued by The Brown Instrument Company, Wayne and Roberts avenues, Philadelphia, Pa. Vapor, gas and mercury actuated types of thermometers are shown, including indicating and one, two and three pen recording models. Flat spiral elements are used in all Brown thermometers and vacuum gauges, which are now cased in modern rectangular cases.

Jar mills are described in catalogue No. 47, issued by the Abbe Engineering Company, 50 Church street, New York. The many types of Abbe mills are shown, which are adapted to wide applications in pulverizing, grinding, dispensing, mixing, compounding, blending and extracting operations.

Multiport drainers are described in Bulletin 2925 issued by the Cochrane Corporation, Allegheny avenue and 17th streets, Philadelphia, Pa. This drainer is designed for continuously removing large quantities of condensate under vacuum or positive pressures, from evaporators, heaters, steam lines, etc. Complete designs, construction details and price data are included.

Bulletin No. V-200 issued by the Flexible Steel Lacing Company, 4607 Lexington street, Chicago, Ill., describes a new line of Alligator V-Belt fasteners for "B", "C" and "D" section v-belts. The fasteners are used only on crosswoven fabric v-belts and should not be used to shorten or repair stretched out or broken endless cord v-belts. The bulletin shows how the fasteners are applied and illustrates various types of applications where endless v-belts could not be used without costly dismantling of the drives.

## L. L. Brown Catalog Has Novel Feature

The L. L. Brown Paper Company of Adams, Mass., is distributing a revised catalog which includes complete information about its four recently announced new lines: Forward Linen Ledger, Forward Bond, Escort Ledger and Machine Posting and Escort Bond. In addition to these papers, the catalog also gives detailed facts about the well known ledgers and bonds made by that company since 1849.

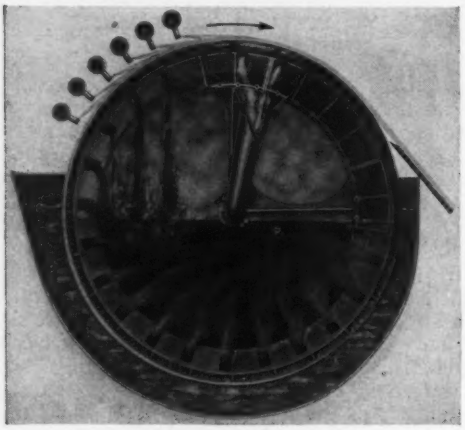
A novel feature of the catalog is an ingenius index which is designed to guide the reader in selecting the right paper for each of a large number of listed uses. This is accomplished by assigning a numeral to each use and employing a corresponding number in the index. Thus the reader may easily identify the particular kind and grade of paper which the company recommends for a stated purpose. This service feature of the catalog has not appeared in previous issues.

The new catalog is 3¾ x 7¼ in size and consists of 28 pages. Copies may be obtained direct from the company or any of its distributors.

## New Black Liquor Pulp Washer

After an extended field demonstration with a commercial size unit installed in an eastern pulp mill, Oliver United Filters Inc. recently has placed on the market an entirely new design black liquor pulp washer. It gives every indication of providing new highs in capacity and washing efficiency.

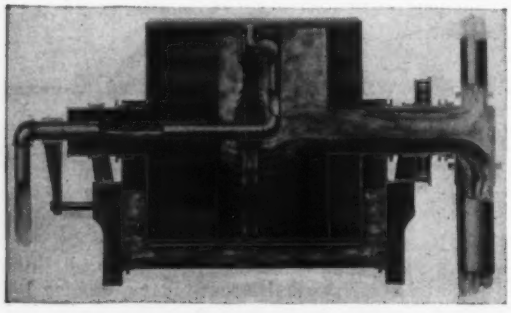
This most recent unit is called the Oliver Ring Valve Washer, a name derived from the design of



SHOWING VALVE PORTS AND WASH LIQUOR HOPPER.

the valve which undoubtedly is the key to the excellent work done by this filter. It is the largest valve ever put into any pulp washer and is so designed as to do two things: (1) permit unrestricted flow of liquor through the wire cover into the drum, and (2) provide for sharp separation between strong black liquor and weak (wash) liquor.

The valve consists of an annular ring encircling the inside of the drum in line with outlets from each section. Each of these outlets in turn has two ports in the valve, one leading, the other trailing, which



SHOWING LARGE DISCHARGE TRUNNION.

allows the liquor to enter the drum and then out through one large trunnion as indicated in the drawing.

For washing purposes, arced gates are set at any desired point on both sides of the ports to cut off the flow into the drum and divert it through a hopper and out through the opposite end of the drum through a pipe, which also serves as the valve adjusting arm. Thus, the wash liquor can be sharply separated from the strong liquor at any point desired. The cut-off can be quickly adjusted from the outside.

Other features of the Oliver Ring Valve Washer are: outlets midway between the ends of the drum, providing shortest travel and assuring uniform sheet formation and highest washing efficiency; non-clogging, low pressure nozzles which lay a fan-shaped spray on the sheet; drum designed to act as a receiver, keeping liquid and air separated, thus reducing foaming of liquors.

## V-Belt Industry Announces Revised Ratings for Multiple Drives

Based on studies of belt life made by Allis-Chalmers Mfg. Company engineers, in conjunction with industry representatives, the power ratings of multiple V-belt drives have been revised to provide maximum belt life. Sheave diameters and correction factors are now standardized according to formulae based on results with multiple V-belt drives over a period of ten years. Overload factors are being arranged also to allow for the type of prime mover and driven machine.

The new ratings provide in many cases for a more compact drive and also for the longest belt life at the lowest initial cost.

Companies co-operating in the new standards include: The American Pulley Company, Browning Manufacturing Company, Inc., The Dayton Rubber Manufacturing Company, R. & J. Dick Company, Inc., Dodge Manufacturing Corporation, Fort Worth Steel and Machinery Company, The Gates Rubber Company, L. H. Gilmer Company, Goldens' Foundry and Machine Company, The B. F. Goodrich Company, the Goodyear Tire & Rubber Company, Inc., W. A. Jones Foundry and Machine Company, The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., the Medart Company, Pyott Foundry and Machine Company, Rockwood Manufacturing Company, United States Rubber Company, T. B. Wood's Sons Company and Worthington Pump and Machinery Corporation.

## New Synthetic Coating Protects Belt Covers from Deterioration

Conveyor installations, on which conveyor belting is used are often idle for considerable periods. During this idleness belting covers may suffer greater deterioration through the effects of sunlight and air, than when the belting is in use. This deterioration also takes place when belts are in storage.

One of the large steel companies, with extensive conveyor installations, had been studying this problem of deterioration, and approached the B. F. Goodrich Company, Akron, Ohio for cooperation. As a result of research into the merits of various compositions, Goodrich is now offering a new synthetic coating for belting covers, which on the basis of its tests, will greatly reduce the effects of aging.

Samples of conveyor belting with covers under severe tension were coated with the synthetic composition, and exposed for six months to all varieties of weather. At the end of that period none of the samples of belting on which the new coating had been applied showed any evidences of cover deterioration. The new product has been designated as Goodrich R-60-T protective coating for conveyor belting.

## Stars on N. A. W. M. D. Banquet Program

The Radio Rogues, a three star team of impersonators which have very largley contributed to the big success that the current show "Hellz a Poppin" has had in New York will be a feature attraction at the twenty-seventh annual banquet of the National Association of Waste Material Dealers, Inc. to be held in the Grand Ballroom of the Hotel Astor on the evening of March 20. As impersonators of prominent world characters and as a humorous threesome there is nothing in New York that surpasses them in entertainment value.

This feature together with the fact that someone attending the banquet is to receive a door prize of $100 cash, is a guarantee that the banquet is going to be a very pleasant and attractive affair. Those who are planning the program state that for a pleasant evening no banquet held in New York by any association is going to surpass the affair to be held by the above Association on the evening of March 20.

Banquet reservation blanks will be mailed to members within the next few days. Reservations will be given consideration in the order in which they are received. The Association's Banquet Committee urges all those who desire to make sure of attending the affair and getting suitable accommodations, to send in their reservations promptly.

## New Flame-Hardening Process Gives Greater Hardness

A higher degree of hardness in steel and alloy iron rolls, mandrels, etc., is being obtained by a new flame-hardening process developed by Linde Air Products Company and in operation at the plant of Farrel-Birmingham Company, Inc., Ansonia, Conn.

This new process is known as the Vertical Combination Method. By using it Farrel-Birmingham are able to raise the hardness of a 65-70 carbon steel cylindrical object to approximately 90 or better on the Type "C" Scleroscope. They have also tested the process considerably in hardening a special dry sand alloy cast iron known as "Farreflame," and have obtained an average hardness of 80 on the Type "C" Scleroscope.

Roll Being Flame-Hardened by New Vertical Combination Method.

Another advantage of this new flame-hardening process, according to Farrel-Birmingham, is the fact that in all the rolls that have been flame-hardened by the Vertical Combination Method no measurable distortion has been detected. Overlap from the flame of the old progressive method of hardening is eliminated because the new process is continuous, uses a large number of flame tips and is followed immediately by a water spray quench.

The Vertical Combination Method has proven very advantageous in many applications. Among these are the following: rubber engraving rolls, embossing rolls, calender rolls under certain conditions, different types of mandrels where excessive pressure or wear must be taken into consideration, certain applications for rolling mills, dough machines, wearing surfaces of bearers in printing machinery and numerous other applications.

Full information regarding this new process of hardening will be furnished by Farrel-Birmingham Company, Inc., to interested executives and engineers who care to write to the company's offices at Ansonia, Conn.

## H&V-Rogers Products

The Hollingsworth & Vose Company, established in 1875 with mills in East Walpole and West Groton, Mass., and The Rogers Paper Manufacturing Company, established in 1832, with mills in Manchester and Goodyear, Conn., are jointly developing, manufacturing and marketing certain products to be designated as H & V-Rogers products. The first two products of this cooperative program are H & V-Rogers Tufro and H & V-Rogers Lektro. These products are tough, high density electrical insulating papers in *continuous rolls*—excellent for motor slot and transformer insulation.

H & V-Rogers Tufro, 100 per cent rag, has a dry dielectric strength of 300 volts per mil, is electrically and chemically clean, has excellent heat ageing characteristics, is suitable for use in hermetic refrigerator motors and has unusual toughness and ply adhesion for an electrical paper in continuous rolls. H & V-Rogers Lektro, 50 per cent rag, also in continuous rolls, has a dielectric strength of 300 volts per mil and is tough. It is electrically clean and has good heat ageing properties and good mechanical strength.

An identifying label will be attached to all H & V or Rogers correspondence, invoices, samples and shipments involving H & V-Rogers Products. Requests for further information or sample full width rolls or coils cut to width may be sent to Hollingsworth & Vose Company, West Groton, Mass., or The Rogers Paper Manufacturing Company, Manchester, Conn.

## Britain Reduces Paper Production

Production of paper in Great Britain has been reduced by 40 per cent, effective Monday February 12, the Ministry of Supply announced last week. The move is intended to conserve currency and shipping space now used to import papermaking materials, the ministry said.

## Announces New Processes

An improved method of producing newsprint in the South at lower costs has been discovered by the United States Forest Products Laboratory at Madison, Wis., according to announcement of C. P. Winslow, director. "The Forest Products Laboratory," he said, "has recently made newsprint paper by mixing unbleached semi-chemical pulp from southern gum trees with groundwood pulp from southern pine."

The gum semi-chemical pulp, Mr. Winslow, explains, replaces the more expensive sulphite pulp component of ordinary newsprint, or the semi-bleached kraft pulp now used with pine ground wood to produce southern newsprint.

"Owing principally to its higher yield, the cost per ton of semi-chemical pulp should be appreciably lower than that of either sulphite or semi-bleached kraft pulp, and possibly no greater than for ground wood," Mr. Winslow said further. "Secondly, gum is one of the southern hardwoods which constitute about one-half the total forest stand in the South. This predominance constitutes a serious problem in forest management until some realistic means for hardwood utilization can be developed. There is real promise of such use in newsprint as production of this grade of paper increases in the south."

In this semi-chemical pulping process, Mr. Winslow explained, wood chips are given a partial cooking with a comparatively small amount of chemical and then disintegrated mechanically, eliminating costly grinding.

Mr. Winslow also reveals that the Forest Products Laboratory is also developing a new pulping process which will help solve the stream pollution with which mills are now struggling. He made an address before the Engineers' Club of Birmingham, Ala., in which he said the new process also would permit the production of pulp and valuable by-products in a single operation.

The method involves the application of hydrogen to wood chips or sawdust in water with alkali and a catlyst under pressure at high temperature, Mr. Winslow explained. This breaks down the raw material into good grade pulp and a variety of alcohols, oils and resin from the lignin and hemicellulose now generally discarded.

Alcohols, oils and resin make up about 60 per cent of the wood substance. These include ethyl and propyl alcohols, some new derivates of propyl cyclohexane and a hard, amber-colored resin that might be used for plastics and lacquers.

Mr. Winslow added that if inherent principles of the process could be "technologically developed," to produce usable pulp comparable to or below present costs and produce new chemicals with industrial uses at the same time, "It would be of great commercial significance. Further, such lignin utilization would aid in relieving stream pollution problems from waste pulp liquors."

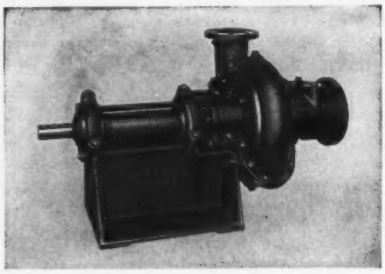
## Horace Torbert Jr., at Mobile

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., February 26, 1940—Horace G. Torbert, Jr., of Hollingsworth & Whitney Company, is at the new plant of the company, under construction at Mobile, Ala., for a few months.

## Centrifugal Pump for Paper Stock

The new F-M centrifugal paper stock pump is a single stage, side suction, open impeller type. The volute casing is diagonally divided along the shaft centerline with the lower half bolted to the pump frame. The suction fitting is bolted to the upper and lower casing halves. This construction permits easy inspection or removal of the rotating element without



NEW F-M PAPER STOCK PUMP

disturbing suction or discharge lines. Washout connections are provided on both suction and discharge sides of the casing and the suction fitting is provided with an inspection hole and cover plate.

The two-blade impeller rotates within renewable casing liners and is secured on the tapered shaft end by an impeller hub nut designed to fit over the turned shoulder provided on the shaft. A centrifugally cast bronze sleeve protects the impeller hub where it passes through the stuffing box. The suction side of the impeller has a screw or auger extension which "bites" in to the stock being pumped.

Heavy duty roller bearings adjacent to the impeller carry the radial load, while a double row of ball bearings on the coupling end carries any unbalanced thrust of the impeller.

This unit, which further enlarges the complete line of F-M centrifugal, rotary turbine, propeller and reciprocating pumps, is described in detail in bulletin 5460 which is available upon request to Fairbanks, Morse & Co., 600 South Michigan avenue, Chicago.

## Honored as Modern Pioneers

John Van Nostrand Dorr, president of the Dorr Company and associated companies here and abroad, was one of a group of American inventors and research scientists who received nineteen awards as Modern Pioneers on the American Front of Industry, from the National Association of Manufacturers at the Waldorf-Astoria Hotel, New York, February 27. The awards were made on the 150th anniversary of the founding of the United States Patent System in recognition of the contributions which these men have made, through the mediumship of their inventions, to the creation of new jobs, new industries and new standards of living.

Alfred F. Harris, chairman of the board of the Harris-Seybold-Potter Company, was one of fifteen who received awards as national modern pioneers at the Hotel Statler, Cleveland, Ohio, Wednesday evening of this week, for his development of the method and machinery of the offset lithographic method of printing.

## Crossett Moves General Sales Offices

It was announced this week that the general sales office of the Crossett Paper Mills will be consolidated with the executive offices at the Mill in Crossett, Ark., March 4. This change is being made in order to give more efficient service to the trade, and to promote closer coordination of production and sales.

Coincidental with this information comes the announcement of the resignation of C. A. Spaulding as general sales manager. Following some 13 years in the merchant field, and 6 years with the National Paper Trade Association as assistant secretary in charge of the wrapping division, Chet took over the task of organizing the sales department for Crossett two years ago. Under his energetic direction the sale of Crossett's Arkansas wrapping and converting kraft, and the leatherneck grades of bleached sulphate, tag board, filing folder, and folding boxboard grades, has kept pace with the rapid growth and development at the Mill.

Five divisional sales offices have been established—the one in New York City being under the direction of Ralph McClelland, the Cincinnati office being in charge of L. O. Lane, Jr., the St. Louis office being managed by J. York Hewitt, and the divisional sales office at Crossett by R. E. McLennan.

The office at 80 East Jackson boulevard, Chicago, now becomes the western division sales office, and will continue to be handled by Sterling E. Brown.

No information is available as to Chet's future plans, nor has any announcement been made as to the appointment of his successor. E. A. Charlton, general manager, will temporarily assume the duties of general sales management.

## Rayonier Prices for Second Quarter

Rayonier, Inc., with headquarters in San Francisco, and sales offices at 122 East 42nd street, New York City, has just announced prices for the second quarter of 1940 on its dissolving types of pulps as follows: Rayaceta, $100.00; Purayonier, $100.00; Hicolor, $80.00; Rayonier, $75.00; Cellunier, $70.00.

The above prices are effective from April 1 to June 30, 1940, inclusive, per ton of two thousand pounds, (2,000) air dry basis (10 per cent moisture), Atlantic Seaboard ports of call, in specified sheet form.

Rayaceta is a new pulp developed by Rayonier for acetylation, and was featured in its exhibit of dissolving grades of pulps at the Paper and Pulp Convention at the Waldorf-Astoria February 19-23. Another pulp featured at the exhibit was a roll of Fernandina production made from Southern Pine, which aroused much interest.

## Scott Paper Co. To Desist

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., February 28, 1940—The Scott Paper Company, Chester, Pa., selling "Waldorf Brand" tissue has entered into an agreement with the Federal Trade Commission to desist from representations to the effect that all products, regardless of their quality, which are sold in competition with "Waldorf Brand" contain splinters, rough or thin spots, dirt or other defects, and from use of any representation unfairly disparaging competitive products.

## Harry Hershfield To Be Toastmaster

Those who are planning to attend or hope to attend the Twenty-seventh Annual Banquet of the National Association of Waste Material Dealers, Inc., to be held in the Grand Ballroom of the Hotel Astor, New York, on the evening of March 20, had best make their reservations very promptly. This affair is shaping up to far outdistance any previous banquet ever held by the association.

Last week the announcement was made that the Radio Rogues from the show "Hellz a Poppin" were to be one of the star attractions of the banquet and this week the announcement was made by the banquet committee that Harry Hershfield, known throughout the country for his humor and satire, would be the toastmaster at the association's banquet.

For the first time since the association established a Pacific Coast Division, there will be a special car leaving San Francisco for the convention and another substantial group will be leaving Los Angeles. Reports following the pre-convention meeting in Chicago indicate a very large attendance from that section.

## Preventing Intellectual Isolation

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., February 26, 1940—To prevent "intellectual isolation" from taking possession, the Institute of Paper Chemistry, Appleton, Wis., places its students in paper mills and brings about personal contacts of institute faculty members with men in the mills, and utilizes bulletins and conferences. This procedure was explained by John Strange, secretary of the Institute, in an address to the Neenah Club, Neenah, Wis. The Institute, he said, is observing its tenth anniversary, with a growth from three students the first year to 54 now, and from 19 member mills to 64 companies operating 350 mills.

There have been 30,000 visitors at the Institute since 1930, Mr. Strange said, among them important officials of European governments traveling incognito.

The research library now has 8,000 volumes and receives monthly 180 different periodicals in 12 different languages.

## Mobile Enlarges Sales Offices

Increasing demands for virgin wood pulp boards has caused the Mobile Paper Company to enlarge its New York facilities. New offices have been opened in suite 1212, in the 51 E. 42nd street building, New York. Alexander Fenton continues in charge of Mobile's new offices. Two trunk lines (Vanderbilt 6-4071 and 4072) have been installed.

Mobile manufactures solid and pasted wood pulp boards from virgin stock; beer mat board up to .100, plain and silicated cracker board, match board, butter carton, patent coated and other specialties.

Promotional counsel has been retained as part of Mobile's program of expanded service to its clients. Mr. Fenton will offer complete mill service on standard and specification products out of the New York offices just occupied.

# FINANCIAL NEWS

### New York Stock Exchange

High, Low and Last for the Week Ending February 28, 1940

| | High | Low | Last |
|---|---|---|---|
| Armstrong Cork Co. | 40⅛ | 39⅛ | 39⅛ |
| Celotex Corp. | 11⅞ | 10⅝ | 11¼ |
| Celotex Corp., pf. | 66½ | 66 | 66 |
| Certain-Teed Products Corp. | 7⅜ | 6⅞ | 7 |
| Certain-Teed Products Corp., pf. | 34¼ | 32⅞ | 33⅝ |
| Champion Paper & Fibre Co. | 22½ | 21½ | 22⅛ |
| Congoleum-Nairn Co. | 24 | 23 | 23 |
| Container Corp. of America | 16½ | 16 | 16 |
| Continental-Diamond Fibre Co. | 7¼ | 7⅛ | 7⅛ |
| Crown-Zellerbach Co. | 17 | 16⅛ | 17 |
| Crown-Zellerbach Co., pf. | 91 | 89⅞ | 91 |
| Flintkote Co. | 19¾ | 19⅛ | 19¾ |
| Robert Gair | 3½ | 3⅜ | 3⅜ |
| Robert Gair, pf. | 15¾ | 14⅝ | 14¾ |
| International Paper & Power | 13¼ | 12½ | 12½ |
| International Paper & Power, pf. | 58¾ | 56⅛ | 56⅛ |
| Johns-Manville Corp. | 70 | 70 | 70 |
| Johns-Manville Corp., pf. | 125 | 124⅝ | 124⅝ |
| Kimberly Clark Corp. | 36¼ | 36 | 36 |
| MacAndrews & Forbes | 34 | 33⅝ | 34 |
| MacAndrews & Forbes, pf. | 134½ | 134½ | 134½ |
| Masonite Corp. | 37 | 35½ | 35⅞ |
| Mead Corp. | 10½ | 10¼ | 10½ |
| Mead Corp., pf. | 66 | 60 | 66 |
| Paraffine Companies, Inc. | 44 | 43⅞ | 43⅞ |
| Rayonier, Inc. | 17½ | 17 | 17¼ |
| Rayonier, Inc., pf. | 28 | 28 | 28 |
| Ruberoid Co. | 19¾ | 19¼ | 19½ |
| Scott Paper Co. | 47 | 47 | 47 |
| Scott Paper Co., pf. | 114 | 113¾ | 114 |
| Sutherland Paper Co. | 35⅜ | 29¼ | 35 |
| Union Bag & Paper Corp. | 14⅛ | 13½ | 13¾ |
| United Paperboard Co. | 4¾ | 4¼ | 4⅜ |
| U. S. Gypsum Co. | 84¼ | 81½ | 81½ |

### New York Curb Exchange

High, Low and Last for the Week Ending February 28, 1940

| | High | Low | Last |
|---|---|---|---|
| American Box Board Co. | 6⅛ | 6 | 6 |
| National Container Corp. | 10⅞ | 10¼ | 10¼ |
| St. Regis Paper Co. | 2⅞ | 2¾ | 2⅞ |
| St. Regis Paper Co., pf. | 67¼ | 66 | 67¼ |
| Taggart Corp. | 5 | 5 | 5 |

## Provincial Earns $935,748

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., February 26, 1940—Provincial Paper Limited, Toronto, in 1939 enjoyed the best fiscal period since 1930. Bond interest, after depreciation and taxes, was earned 2.8 times compared with 2.2 times in 1938, and net earnings were equal to $9.82 a share on the preferred stocks contrasted with $6.92 a share for 1938. After preferred dividends there was a balance of earnings on the common stock equal to 99 cents per share as against no earnings available for the common in the preceding year.

Profit for 1939 amounted to $935,748 an increase from $784,804 for 1938. After depreciation; $300,000 interest, $187,000, and $105,000 income taxes, there remained a net profit of $343,748, compared with $242,202 the year before. Dividends at the annual 7 per cent, amounting to $245,000, were paid on preferred and the balance of $98,748 was added to surplus to increase total surplus from $1,003,291 to $1,102,039.

Net working capital is up from $2,482,351 to $2,803,954. Current assets of $3,264,763 compare with $2,894,974, and current liabilities of $460,809 with $412,723. Cash shows a substantial increase at $1,050,508, against $281,350, reflecting the payment of advances to receiver and manager of Abitibi Power and Paper, which at Dec. 31, 1938 amounted to $600,000. Total assets of $13,126,229 contrast with $12,687,602 at the end of 1938.

## Great Lakes Nets $236,936

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., February 26, 1940—Great Lakes Paper Company, Limited, Fort William, Ont., reports for year ended December 31, 1939, net profit of $236,936, after depreciation, bond interest, Dominion and provincial income taxes, etc., equal to $1.18 per share on the combined 200,000 shares of class A and class B preferred shares outstanding. This compares with net profit of $134,491, or 67 cents per share in the previous year. Both classes of preferred stock are entitled to dividends of $2.00 a share per year, and are in arrears to the amount of $7.50 per share as of December 30, 1939.

Balance sheet as of December 31, 1939, shows current assets of $2,542,085 against current liabilities of $528,222, leaving net working capital of $2,103,863. This compares with net working capital of $1,590,987 at the end of the previous year. Cash was up at $459,734 against $24,308. Receivables less reserves, were $436,938 against $432,302. Inventories of $1,475,586 compare with $1,940,679 in the previous year.

The balance sheet reveals that the company has converted last year's item of notes receivable resale of investments amounting to $125,000 into its own bonds which are carried at $134,662 and held for sinking fund. It is also shown that the loan held by the Dominion Bank amounting at the end of 1938 to $56,000 had been retired. Also noteworthy is the fact that in 1939 the company showed provision for depreciation of $449,521 against $319,146 in the previous year. Operating profit in 1939 of $1,053,941 included $115,235 profit on foreign exchange.

## U. S. Gypsum Nets $7,365,847

The report of the United States Gypsum Company and its subsidiaries for 1939 shows a net income of $7,365,847 after depreciation, depletion, Federal income taxes and other charges. This is equivalent, allowing for dividends on the 7 per cent preferred stock, to $5.71 each on 1,194,160 shares of common stock. It compares with a net profit of $4,725,497, or $3.50 each on 1,194,156 shares of common stock, for 1938.

## Johns-Manville Votes $1.75 Dividend

Directors of the Johns-Manville Corporation voted the regular quarterly dividend of $1.75 on the preferred stock, but took no dividend action on the common. Payments on the common stock last year were 75 cents in September and $2 in December. The company also announced that Robert W. Lea, vice president, was elected a director.

## Modern Containers Earns $43,426

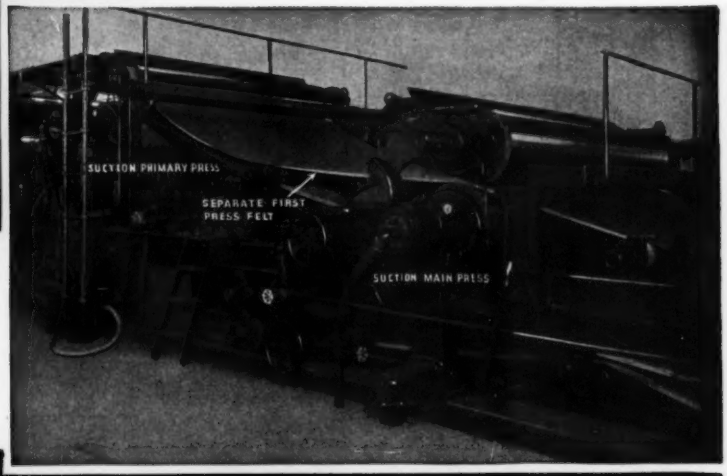
[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., February 26, 1940—Improvement in 1939 operations is indicated by Modern Containers, Limited, formed in June last as an amalgamation of Collapsible Tubes and Containers and Modern Ma-

# Suctionize

## YOUR BOARD MACHINE WITH Beloit SUCTION

- DRUM PRESS *
- PRIMARY PRESS
- MAIN PRESS




**Note the short top felt for suction drum press nip. All plain primaries have been removed.**

**Wet pickup felt returns after suction primary press. Suction first press is on separate felt.**

1. Removes large quantity water without disturbing formation or finish.
2. Reduces crushing and checking.
3. Improves finish. Reduces felt marks.
4. Permits use of light weight short top felt. Lower felt cost.
5. Eliminates several nips. Improves test of board.
6. Permits more bulk if desired.
7. Increases test or permits cheaper furnish and maintain same test.
8. Suction main press more efficient on separate felt.

* Suction drum press is equivalent to suction drum and suction primary press.

BELOIT IRON WORKS PAPER MACH'Y BELOIT WIS.

*THE BELOIT WAY IS THE MODERN WAY*

**BELOIT IRON WORKS, BELOIT, WIS.**

chine Company, Limited. Prior to amalgamation earnings amounted to $23,891 and were $43,426 for the balance of the year, making a total of $67,317. After allowing for full preferred dividend needs, the balance amounted to $2.03 per common share. The net profits on the combined business amounted to $43,481 in 1938, equal to $1.08 on the common on basis of present capitalization compared with 86 cents in 1937. Current assets of $377,468 compare with current liabilities of $37,706 leaving net working capital of $339,762 compared with $306,110 a year earlier.

## Rayonier Nets $1,425,193

Rayonier, Inc., reports for the nine months to January 31 a consolidated net profit of $1,425,193, against $1,421,431 in correspondingly the year before, equal, after regular preferred dividend requirements, to about 50 cents each on 963,872 shares of common stock for both periods. Quarter to Jan. 31: Consolidated net profit, $555,041, against $652,636 in the preceding quarter, and $1,539,801 in January quarter a year ago.

## Container Corp. Nets $1,448,900

The Container Corporation of America reports in its annual statement for 1939 a net profit of $1,448,900 after all charges, including taxes, compared with $29,470 earned in 1938.

Walter P. Paepcke, president, said the earnings were equal to $1.85 each on the 781,253 shares of common stock, compared with 4 cents a share for 1938.

## Paraffine Companies Pay Dividend

Paraffine Companies, Inc., have announced the declaration of a 75-cent dividend to holders of the common stock. In 1939 payments were 50 cents each in March, June and September and 75 cents in December.

## Rhinelander Nets $272,456

The Rhinelander Paper Company for 1939 reports a net income of $272,456, equal to $1.82 each on 150,000 capital shares, against $118,140, or 79 cents a share the year before.

## Dennison Pays $3 Dividend

Directors of the Dennison Manufacturing Company have authorized an initial dividend of $3 a share on the prior preferred stock, payable April 1 from earnings of the last half of the year 1939.

## A. P. W. Paper Nets $46,369

For the 28 weeks ended January 13, 1940, the A. P. W. Paper Company reports a net profit of $46,369. For the six months ended December 31, 1938, a net loss of $17,017 was reported.

## Fort Orange Nets $103,772

The Fort Orange Paper Company for 1939 reports a net income of $103,772, equal after preferred dividends to $7.57 each on 10,000 common shares.

## Joseph E. Holmes Elected President

The annual stockholders meetings of the Chemical Paper Manufacturing Company and Crocker-McElwain Company were held at the office of the companies in Holyoke on February 13 and 14 respectively. Immediately following the meeting of the stockholders the directors of each company elected Joseph E. Holmes president of these two organizations. He succeeds the late Clifton A. Crocker who served as president of the Crocker-McElwain Company from its organization in 1904, and the Chemical Paper Manufacturing Company from its organization in 1913.

The directors also elected E. Franklin McElwain, vice president and general manager and Elmer C. Tucker and Arthur H. Hill, vice presidents of the Crocker-McElwain Company. The directors of the Chemical mill elected Ralph H. Morrill, vice president and general manager and Elmer C. Tucker, vice president.

At the meeting of the stockholders of the Crocker-McElwain Company, Ralph H. Ellis was elected, clerk, Joseph E. Holmes, treasurer and Philip W. Gridley, assistant treasurer. The following directors were also elected: Wallace V. Camp, Ralph H. Ellis, Arthur H. Hill, Joseph E. Holmes, R. Franklin McElwain, Elmer C. Tucker and John B. Van Horn.

The stockholders of the Chemical Paper Manufacturing Company elected Ralph H. Ellis, clerk and Joseph E. Holmes, treasurer and Ralph H. Morrill, assistant treasurer. They also elected the following directors: Wallace V. Camp, Ralph H. Ellis, Joseph E. Holmes, R. Franklin McElwain, Ralph H. Morrill, Elmer C. Tucker and John B. Van Horn.

The clerk, Ralph H. Ellis, read resolutions on the passing of the president and founder of these two companies, Clifton A. Crocker, who died December 14, 1939.

## Robertson Box Nets $88,094

The Robertson Paper Box Company, Inc., for 1939 reports a net income of $88,094, or 29.4 cents on each common share, against $74,078 in 1938, equivalent to 23.28 cents a common share after requirements on preferred stock, which was retired in 1939.

## Bird & Son Earns $757,600

Bird & Son, Inc., and subsidiaries reports for 1939 a net income of $757,609, equal, after preferred dividends, to $1.14 each on 567,196 common shares, compared with 1938 net of $376,470, or 42 cents a common share.

## S. D. Warren Nets $465,916

The S. D. Warren Company and wholely owned subsidiaries reports for 1939 a net profit, $465,916, equal to $4.59 each on 101,387 shares of common stock, compared with $164,364, or $1.62 a share, for 1938.

## West Virginia Declares Dividend

A dividend of 10 cents a share was declared on the common stock of the West Virginia Pulp and Paper Company, an increase of 5 cents over previous quarterly disbursements.

## Indianapolis Steady

[FROM OUR REGULAR CORRESPONDENT]

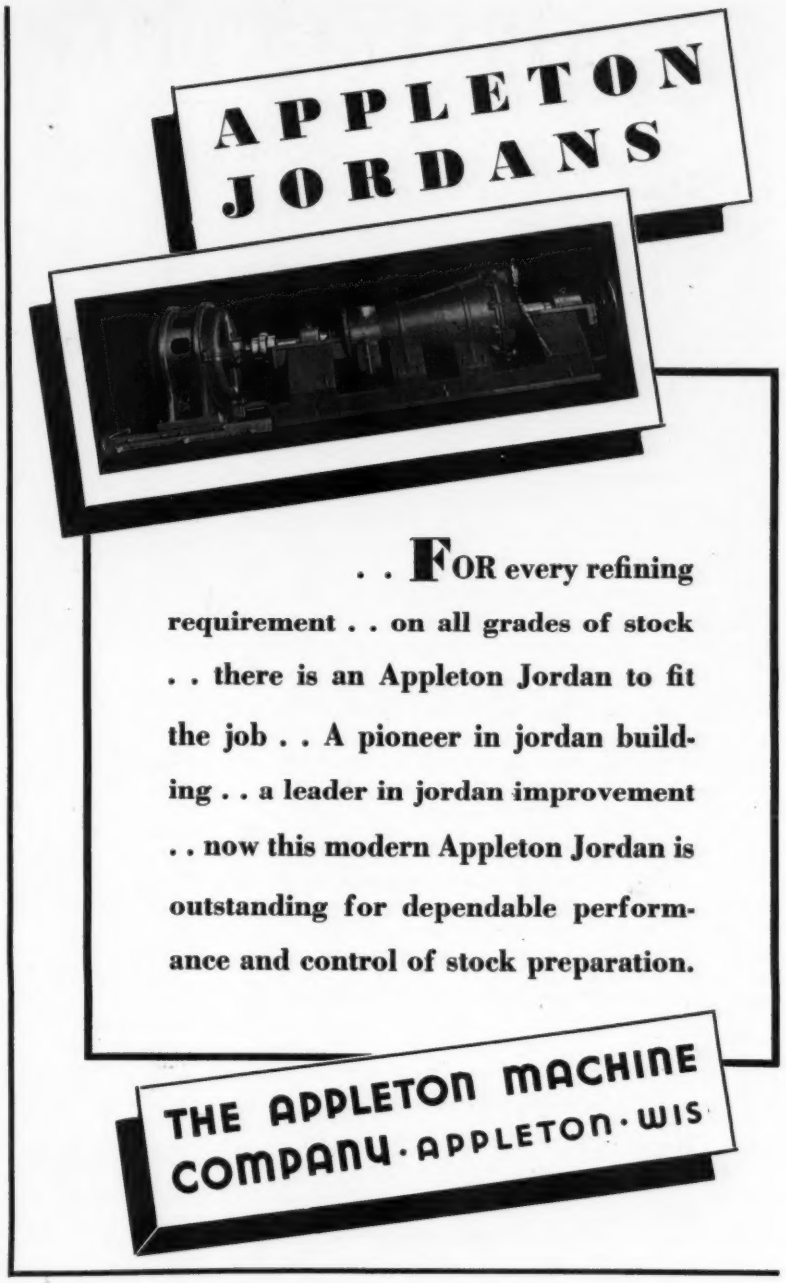
INDIANAPOLIS, Ind., February 26, 1940—While little improvement was seen in the general paper outlook here during the last week, members of the trade say the situation is far from disappointing. The first two months of the year, in most lines, will compare favorably with the same period a year ago. The fine paper market goes along on an even tempo with no disturbing factors in the picture. Demand is steady for all grades and prices have been held firm.

Demand for newsprint is rather more quiet than had been expected. Lineage is slightly lower than it was a year ago, but some of this may be attributed to severe weather which has been in effect almost continuously since the first of the year. A break in the weather should cause an almost immediate increase in lineage. Local printers say there is quite a bit of direct mail advertising in prospect for spring, which should aid the fine paper demand, they say.

Early demand for building paper and roofing has been distinctly disappointing. Construction volume throughout the state has fallen down from last year's first two months. Some orders have been placed for delivery around March 15, but the volume is not as large as had been expected. Dealer stocks are said to be small, but well balanced and they are not likely to buy heavily until it has been more nearly determined what the probable demand will be for spring.

Container factories here report a good business. Volume is up to that of last year and orders show a widening of the customer base. Prices are being held firmly and production showed a slight increase last week. Some inquiries have been received for summer specialties and some few early orders placed. Local jobbers believe this will be equally as good a summer as last if weather conditions are favorable. Tissues remained steady.

Virtually no change was seen in the paper stock and rag market. Mill demand continues slow and prices have a week tendency.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## B. C. Increases Pulp Wood Exports

VANCOUVER, B. C., February 24, 1940—British Columbia is increasing her export of pulpwood and last year, on the basis of the first six months' shipments, sent out to the United States and Japan alone enough hemlock and balsam, chief pulp species, to produce 120,000 tons of pulp. This is equivalent to about 600 days of operation of the average British Columbia pulp mill.

Log exporters state that the trend is for even greater shipments of pulpwood in the form of loss from British Columbia. American pulp mills are paying a dollar a thousand feet more than Canadian operators, and Japan is back in the market on the biggest scale in many months.

During the next two or three months Japan will take fifteen to twenty million feet of B. C. hemlock logs, which is as much as the Japanese market absorbed during the whole of last year. Sales to the United States will be much greater than to Japan.

# CONSTRUCTION NEWS

**Portland, Ore.**—Western Waxed Paper Company, North Portland, manufacturer of waxed and other processed paper stocks, has approved plans for one-story addition to mill, primarily for storage and distribution. Cost reported over $45,000, with equipment. General contract for erection has been let to Reimers & Jolivette, Railway Exchange Building, Portland, and work will be placed under way at once.

**Mobile, Ala.**—The National Gypsum Company, 190 Delaware avenue, Buffalo, N. Y., manufacturer of fiber insulation board, wall board, etc., has plans under way for new addition to branch mill at Mobile, consisting of a one-story structure, about 80 x 600 feet, for storage, distribution and other service. Cost estimated close to $150,000, with equipment. H. K. Ferguson Company, Hanna Building, Cleveland, Ohio, is engineer. Bids are scheduled to be asked soon for general erection.

**Long Island City, New York**—Brite Corrugated Box Company, 51-12 21st street, Long Island City, manufacturer of corrugated boxes and containers, has leased space in building at 21-09 Borden avenue, Long Island City, and will occupy for expansion.

**Plainfield, N. J.**—The Sanitary Products Corporation of America, Inc., Lewis and Ashland streets, Philadelphia, Pa., manufacturer of paper plates and dishes, and other fiber products, will concentrate production largely at new plant at Plainfield, recently referred to in these columns, increasing present output. Company has taken over a one-story industrial building at 633-55 North avenue, aggregating about 50,000 square feet of floor space, and has begun work for immediate occupancy. Structure is located on a tract of about 3½ acres of land, allowing for future expansion. Equipment will be provided for large output. John B. Dunne is head.

**Richmond, Va.** — The Western Tablet and Stationery Company, Mitchell avenue and Eleventh street, St. Joseph, Mo., manufacturer of paper specialties, has superstructure under way for new one-story factory branch, storage and distributing plant, 120 x 200 feet, at Eighth and Everett streets, Richmond, for which general contract recently was let to Allen J. Saville, Electric Building, Richmond. Award for structural steel framing has been given to the Ross Structural Steel Company, and for brick work to Hunt & Terrence Company, both of Richmond. New structure will cost close to $50,000, including equipment, and is scheduled to be ready for occupancy in the spring. Company is a subsidiary of the Hopper Paper Company, Taylorville, Ill.

**Albany, N. Y.**—The Hudson Valley Paper Company, 520-22 Broadway, is considering early rebuilding of portion of mill, destroyed by fire, February 20, with loss reported over $150,000, including equipment.

**Painesville, Ohio**—The Industrial Rayon Corporation, West 98th street and Walford avenue, Cleveland, Ohio, manufacturer of cellulose rayon products, has plans under way for new addition to branch mill near Painesville, comprising several one-story units, designed to increase present floor space about 50 per cent, with several adjoining buildings for mechanical service. Cost is reported over $3,000,000, including machinery. It is understood that work is scheduled to begin during the spring, with completion early in 1941. Wilbur Watson & Associates, 4614 Prospect avenue, Cleveland, are engineers. Hiram S. Rivitz is president.

**Los Angeles, Calif.**—The Pioneer-Flintkote Company, 5500 South Alameda street, Vernon, manufacturer of roofing products, wall board, etc., has awarded contract to the William P. Neil Company, 4814 Loma Vista street, for new addition to plant, for raw material storage and distribution. Work will be placed under way at once. No estimate of cost announced.

**Chicago, Ill.**—W. C. Ritchie & Co., 8855 South Baltimore avenue, manufacturer of paper boxes, fiber cans and containers, etc., has closed bids on general contract for proposed new plant unit at 8900 South Baltimore avenue, previously referred to in these columns, and will make award at early date. It will be three-story and basement, reported to cost in excess of $150,000, instead of smaller amount noted in former reference, including equipment. Shaw, Naess & Murphy, 80 East Jackson boulevard, are architects.

**Newark, N. J.**—The Marsh Wall Products Company, Dover, Ohio, manufacturer of wall board and other composition wall products, has arranged for lease of industrial property at 74-96 Woolsey street, Irvington, Newark, formerly occupied by the Cook & Genung Company. It consists of two one-story buildings, and will be improved and equipped by company for new factory branch, storage and distributing plant.

**DeLair, N. J.**—The Kieckhefer Container Corporation, manufacturer of corrugated boxes and containers, has taken bids on general contract for alterations and improvements to machine buildings Nos. 1 and 2 at local plant, and will make award for work at early date. No estimate of cost announced. Carson & Carson, Commercial Trust Building, Philadelphia, Pa., are engineers.

**Louisville, Ky.**—The Reynolds Metals Company, Camp Ground road, manufacturer of metal foils, foil labels, etc., will give over a large part of new additions to plants at Louisville, recently referred to in these columns, for converting service, using a gravure process, and this will be made the Western headquarters for such production, heretofore concentrated entirely at company branch plant at Harrison, N. J. Company has taken over former local assembling works of Ford Motor Company, consisting of several one-story units, totaling 107,000 square feet of floor space, and work is in progress on installation of equipment. Plans also are maturing for new one-story plant unit on Camp Ground road, estimated to cost over $150,000, with equipment, and work is expected to proceed in the spring. R. S. Reynolds is president.

**Powell River, B. C.**—The Powell River Company, Ltd., Standard Bank Building, Vancouver, B. C., manufacturer of newsprint, has approved plans for new addition to mill at Powell River, to be used

for laboratory and kindred technical service. It will be two-story, 50 x 85 feet, estimated to cost close to $50,000, with equipment. General contract for erection has been let to Stuart Cameron & Company, Ltd., 710 Seymour street, Vancouver, and work will be placed under way at once. McCarter & Nairne, Marine Building, Vancouver, are architects.

### New Incorporations

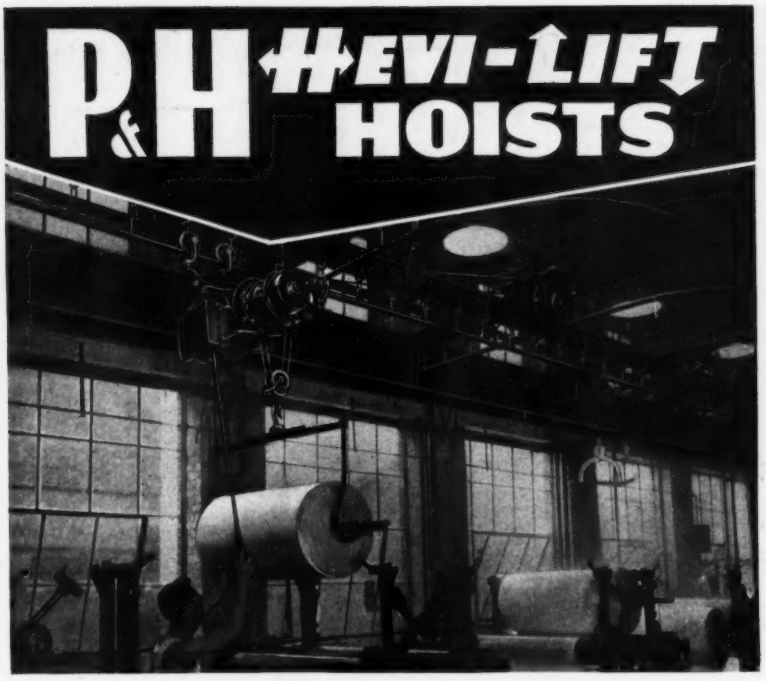
**Boston, Mass.**—The A. & E. Paper Company, Inc., 56 Clinton street, has been incorporated with capital of 100 shares of stock, no par value, to deal in paper products of various kinds. Morris and Ezra Hershkovitz are president and treasurer, respectively.

**New York, N. Y.**—The New York Cellulose Corporation has been chartered with capital of $20,000, to manufacture and deal in cellulose products. New company is represented by Morris Rosoff, 261 Broadway, New York, attorney.

**Chicago, Ill.**—The International Label Company, 4817 North Kimball avenue, has been organized with capital of $5000, to manufacture and deal in paper labels and kindred paper goods. The incorporators include H. Menster and S. Sockel, 4817 North Kimball avenue, Chicago. Last noted is company representative.

**Rochester, N. Y.**—A. B. Cowles Company, Inc., has been chartered with capital of $5000, to manufacture and deal in paper products of various kinds. New company is represented by Chamberlain, Page & D'Amanda, E. & B. Building, Rochester, attorneys.

**Newark, N. J.**—The Carton Corporation has been incorporated with capital of 2000 shares of stocks, no par value, to deal in paper boxes and containers, cartons, etc. New company is represented by Irving E. Kosky, 9 Clinton street, Newark, attorney.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## Gotham Mills Start

[FROM OUR REGULAR CORRESPONDENT]

BATTENVILLE, N. Y., February—The paper mill here, recently taken over by the Gotham Paper Mills, Inc., has resumed production with indications that all equipment will be in operation soon. Many employees from this section are finding work on the machine turning out tissue paper and the first carload of the finished product was shipped early this week. Preparations for starting the second machine are being pushed with expectations that it will be placed in operation next week. With this machine in operation it will be possible for the company to employ about forty hands. John Jacobs is continuing as superintendent under the new management and it is expected that all former employees will be recalled. The mill property includes the water power on the Battenkill and was purchased by its present owners at an auction sale held last January. The sale was under foreclosure proceedings instituted by the Reconstruction Finance Corporation which had helped to finance improvements to the mill by its former owners, the Battenville Mills, Inc.

PAPER TRADE JOURNAL
Title Reg. U. S. Pat. Off.

Henry J. Berger
EDITOR

Vol. 110 February 29, 1940 No. 9

## COMING EVENTS IN PAPER INDUSTRY

New England Section. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Delaware Valley Section. Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

Lake States Section. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Kalamazoo Valley Section. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

## BUSINESS PROSPECT GOOD

Although industrial activity and trade has been declining since the first of the current year there is a basis for the expectation of an improvement in general business activity during the latter part of March. According to the Federal Reserve Board's index of industrial production, output declined from a high of 128 in December to 120 in January and continues to fall this month. Latest reports covering the whole country indicate that business is spotty and equal to the national average in 8 states, above the average in 18 states and below it in 22 states. Exports have increased against the seasonal trend and the absence of any marked liquidation in the securities markets is held to be a favorable indication of the near future. Hostilities in Europe, however, make the long-range view of business uncertain.

According to the Chamber of Commerce of the United States, "The evidence indicates that the good level of February, 1937, has been regained and probably somewhat exceeded. Moreover, the adverse factors which were present in early 1937, and which later in that year brought abrupt reversal, not only in business but in prospects for a balanced federal budget, are not now in evidence. Such adverse factors as exist today are of a different sort, such as uncertainities abroad, but are not likely to have results in the United States such as were produced by domestic influences in 1937.

"Measured by general indices for January, 1940, February business began at a high level. The federal Reserve Board's straight index for industrial production for January will be the highest for any January in the country's history. Whatever this index proves to be for February, it will undoubtedly be the highest for any February."

A favorable indication of the future of industry and trade is seen in the improvement in durable goods and the Chamber comments on this phase of business activity as follows: "Consideration of data ranging from sales by department stores to figures for production brings out some important features of the present level of business. After having in December, 1939, the highest volume of business since December, 1929, department stores in January had sales at the level of January, 1937. In other words, the increase in industrial production would seem clearly to exist, not so much in consumer goods as in durable goods, the part of production that had such long depression, and that slumped most after the debacle of 1937. The increase in consumer goods has been marked, but the outstanding advance has been in the materials and equipment that are essential for still further production.

Price levels in the face of rising production show a remarkable performance. Without exception, each group of commodities is maintaining a level of wholesale prices below the level reached in 1937. In other words, although prices generally had by September, 1939, been declining for two years and more, they have not returned to the levels of 1937, which in themselves were well below the levels of 1929, itself not a high-price year. On the face of the record, both production and prices have been kept well in hand".

According to the monthly report of the National Association of Purchasing Agents issued February 24, business expectations are for improvement in the coming months rather than for a marked decline. "The decline in new orders is becoming an accepted fact in most circles," states the report, "as it had been fully realized that the heavy manufacturing schedules of recent months were in excess of normal domestic needs and could be continued only on the basis of increased foreign trade, which at this period would mean orders due to the conflict in Europe.

Commodity prices are showing additional weakness quite generally, but not fully following the sharp decline that is occurring in business activity in many lines. Reduced prices have not brought in any new business. Commodity prices should be supported during the year by the need of protecting operating schedules through more liberal supplies of materials, inasmuch as Europe may demand large quantities at any time. Inventories have been reduced all along the line, except in Canada. While plants are now using up materials bought last Fall, and not replenishing them so heavily, it is unlikely that stocks will be allowed to recede to the low point of a year or two ago. Collections are reported satisfactory. Employment is losing ground under prevailing industrial conditions and a further shrinkage will take

place unless a turn for the better occurs rather soon. There is a definite policy of reducing the working hours in manufacturing concerns rather than the number of persons employed, but curtailment of running time on a wide range gradually affects employment totals under the best of intentions.

Majority opinion is that, while industrial turnover has receded noticeably of late, there are few indications of drastic decline. While export volume has increased since last Fall, foreign trade as a whole is most disappointing, and the rise or fall of this volume may determine manufacturing operations during the Spring and following months."

In commenting on tax relief as aid to business, Godfrey N. Nelson, lawyer, tax expert and secretary of The New York Times Company, said in part: "It seems obvious that the paramount need of this period is a general recognition of the direct relationship of new industrial investment to a permanent expansion of business activity. When this relationship is recognized, the essential steps in the process by which business activity can be stepped up will almost automatically present themselves. At the present time burdensome taxes make business unattractive to new investors. And the channels through which equity capital offerings may be made should be cleared of unreasonable obstacles. Business must be afforded not only safety of principal, but also the opportunity of earning profits sufficiently attractive to encourage new investments in equities."

## J. T. Gamble Goes With Florida Paper Co.

J. H. Allen, president of the Florida Pulp and Paper Company of Pensacola, Fla., announced last week that John T. Gamble, former local manager of the Savannah plant of the Union Bag and Paper Corporation, had been made executive vice president and director of the Florida Pulp and Paper Company and will be located at Pensacola. He will be in charge of construction and operation of the pulp and paper mill of the company when built. Like Mr. Allen, Mr. Gamble will continue to retain his home in Savannah.

Mr. Allen issued the following statement: "Mr. Gamble has been a manufacturer of paper all of his commercial life. His first employment was with the North Ireland Paper Company in North Ireland from 1904 to 1912 and later with the Wayagamack Pulp and Paper Company in Canada the years 1912 to 1923. This constituted a continuance of service with one set of stockholders for nineteen years. He was associated with Crown-Zellerbach of San Francisco 1923 to 1929; from 1929 until very recently he was associated with the Union Bag and Paper Corporation.

"The Florida Pulp and Paper Company should complete its financing and should start construction within the next four months. In the meantime the corporation is producing some of its timber, perfecting its forestry plan and perfecting also the design of its mill."

## Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES[1]

| Months | 1940 | 1939 | 1938 | 1937 | 1936 | 1935 | 1934 |
|---|---|---|---|---|---|---|---|
| January | 90.9% | 77.5% | 63.9% | 90.3% | 76.1% | 65.8% | ..... |
| February | ..... | 81.7% | 68.7% | 90.1% | 77.9% | 70.0% | ..... |
| March | ..... | 84.0% | 69.6% | 90.3% | 76.0% | 70.5% | ..... |
| April | ..... | 82.9% | 68.3% | 92.1% | 82.3% | 70.0% | ..... |
| May | ..... | 80.2% | 69.0% | 90.6% | 81.6% | 69.4% | ..... |
| June | ..... | 79.7% | 66.0% | 87.3% | 80.7% | 72.3% | .... |
| July | ..... | 75.2% | 72.0% | 81.8% | 77.3% | 64.9% | ..... |
| August | ..... | 82.9% | 77.2% | 82.9% | 81.5% | 70.9% | ..... |
| September | ..... | 88.7% | 76.3% | 78.6% | 80.5% | 71.9% | 58.2% |
| October | ..... | 96.6% | 82.5% | 73.5% | 87.6% | 75.6% | 64.7% |
| November | ..... | 97.2% | 79.6% | 61.9% | 88.0% | 75.3% | 61.7% |
| December | ..... | 91.1% | 74.4% | 54.5% | 85.9% | 71.2% | 59.6% |
| Year Average | ..... | 84.9% | 72.3% | 80.6% | 81.3% | 70.5% | ..... |
| First 7 weeks | 89.8% | 79.4% | 65.6% | 90.0% | 76.7% | 67.1% | ..... |

COMPARATIVE WEEKLY SUMMARIES[1]

| CURRENT WEEKS, 1940 | | CORRESPONDING WEEKS, 1939 | |
|---|---|---|---|
| January 13 | 93.4% | January 14 | 80.4% |
| January 20 | 90.8% | January 21 | 78.0% |
| January 27 | 91.9% | January 28 | 81.4% |
| February 3 | 89.7% | February 4 | 80.7% |
| February 10 | 88.5% | February 11 | 82.8% |
| *February 17 | 84.5% | February 18 | 82.6% |

The following statistics show the number of mills reporting by ratio groups:

| | Number of Mills Reporting—Current Weeks | | | | | |
|---|---|---|---|---|---|---|
| Ratio Limits | Jan. 13, 1940 | Jan. 20, 1940 | Jan. 27, 1940 | Feb. 3, 1940 | Feb. 10, 1940 | Feb. 17, 1940 |
| 0% to 50% | 47 | 41 | 48 | 45 | 45 | 42 |
| 51% to 100% | 251 | 259 | 252 | 252 | 238 | 167 |
| Total Mills Reporting | 298 | 300 | 300 | 297 | 283 | 209 |

PAPERBOARD OPERATING RATIOS

Per cent of operation based on "Inch-Hours" reported to the National Paperboard Association.

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July |
|---|---|---|---|---|---|---|---|
| 1936 | 62% | 67% | 67% | 70% | 69% | 70% | 69% |
| 1937 | 80% | 86% | 86% | 88% | 85% | 77% | 66% |
| 1938 | 54% | 60% | 61% | 57% | 58% | 56% | 57% |
| 1939 | 60% | 67% | 71% | 69% | 64% | 67% | 63% |
| 1940 | 71% | .... | .... | .... | .... | .... | .... |

| Year | Aug. | Sept. | Oct. | Nov. | Dec. | Year Avg. |
|---|---|---|---|---|---|---|
| 1936 | 75% | 78% | 82% | 80% | 74% | 72% |
| 1937 | 74% | 69% | 65% | 55% | 45% | 73% |
| 1938 | 66% | 66% | 70% | 65% | 59% | 61% |
| 1939 | 72% | 74% | 84% | 81% | 71% | 70% |

Week end. Jan. 13, 1940—74%
Week end. Jan. 20, 1940—72%
Week end. Jan. 27, 1940—75%
Week end. Feb. 3, 1940—72%
Week end. Feb. 10, 1940—71%
Week end. Feb. 17, 1940—70%

[1] Production-capacity ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.
* Preliminary figure.

## Buys Paper Under Walsh-Healey Act

WASHINGTON, D. C., February 28, 1940—For the week ended February 10, the Government purchased $25,684.29 worth of paper and allied products under the Walsh-Healey Act as follows: $10,680.79 worth of binders board for the Government Printing Office from R. P. Andrews Paper Company, Washington, D. C.; and $15,003.50 worth of ledger paper for the Government Printing Office from The Mudge Paper Company, Baltimore, Md.

## Gair Co. to Pay Interest

The directors of Robert Gair Company, Inc., at a meeting held on February 23, 1940, declared the full 6 per cent interest on Robert Gair Company, Inc. Income Notes 1972s, payable April 1, 1940 to the holders of record at the close of business March 30, 1940.

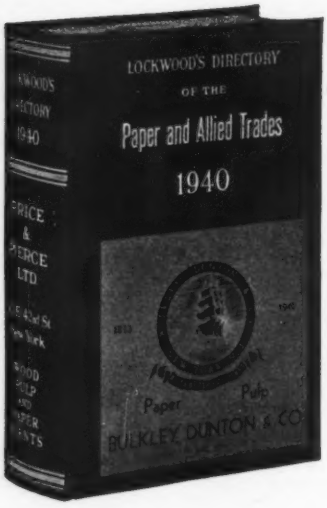
*New Edition*

# LOCKWOOD'S DIRECTORY OF THE PAPER AND ALLIED TRADES

*1940—65th Annual Edition—1940*

## REGULAR EDITION

Addresses of Equipment and Supply Firms
Alphabetical List of Paper Specialties Manufacturers
City Addresses of Mills and Mill Supply Houses
Classified List of Paper Mill Products, United States and Canada
Classified List of Pulp Mill Products, United States and Canada
Coated Paper Manufacturers
Envelope Manufacturers
Equipment, Supplies and Technical Service
Firms Having Two or More Mills in United States and Canada
Glazed and Coated Paper Manufacturers
Mill Officials
Pad Manufacturers
Paper and Pulp Mills in United States and Canada
Paper and Pulp Mills in Cuba and Mexico
Paper Bag Manufacturers
Paper Box Manufacturers
Paper Makers' Chemicals and Supplies
Paper Merchants, United States and Canada
Paper Specialties
Papeterie Manufacturers
Prepared Roofing Manufacturers
Pulp Testing Chemists
Rags and Paper Stock Consumed by the Mills
Rag and Paper Stock Dealers
Statistical Table of Mills
Tablet Manufacturers
Tag Manufacturers
Toilet Paper Manufacturers
Trade Associations
Twine Manufacturers in United States and Canada
Vegetable Parchment Paper Manufacturers
Wall Paper Printers
Watermarks and Brands
Waxed Paper Manufacturers
Wood Pulp Importers

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# Notes on the Quality of Groundwood*

By James d'A. Clark[1]

**Abstract**

*Visual and manual practical tests for the quality of groundwood pulps are described with a discussion of the interpretation of results obtained from instruments and sheetmaking equipment. Data are given on the effect of beating on fairly fine groundwoods, which, as far as quality improvement is concerned, appears to be negligible. Marked anomalies in the use of freeness testers for determining slowness are noted and attributed to the escape of important fine material through the grid plate of the apparatus. For this reason the value of the freeness reading for fine pulps or pulps containing much fine material, is questioned. Classification of pulps and blending tests are shown to be very valuable in addition to common tests and in some cases indispensible for distinguishing between pulps of obviously widely different characteristics.*

During many years following the commercial production of groundwood or mechanical pulp it was regarded as little better than a fibrous filler for the cheaper grades of paper and boards. Its employment as a major constituent of newsprint soon developed, but for a long time, indeed, during the first two decades of this century, except to some small degree in those mills preparing their own pulp, groundwood was regarded very much as a standard material provided it was reasonably clean, free from an undue number of shives and not visibly too coarse.

## Practical Tests

A test for quality of groundwood that had some vogue was to place a wad of it in the mouth and, if it had a "raggy chew," it was good pulp. If it had not, and in buying and selling pulp this elusive quality seemed to be somewhat dependent upon the asking price, the purchaser perhaps demanded a dollar or so per ton off the price, between chews.

Another test which still has a few adherents, was to tear a sample sheet, hold it up to the light and depending whether you were seller or buyer, either marvel at the length of visible fibers or to snort about their shortness.

A test still prevalent to some extent, and which may be placed in the same category as the chewing test, is the "skinning" of a layer of pulp from a wet pressed lap. While possibly affected to some extent by quality, the predominant influences on the result are the moisture of the lap, the pressure employed on the wet machine couch roll, and perhaps also the thickness of the web of pulp as it is wound around the couch roll to build up the final thickness of sheet. If the sheet is crushed slightly during couching, obviously it will not skin no matter how good the pulp is. However, if the lap can be skinned, a good way to observe the presence of shives and coarse fibers is to do so and hold the thin part against the light.

## Visual Tests

From the earliest days, however, technicians have used the microscope or a projection lantern as means of determining quality and, with experience, there is little doubt that a very fair estimate of the quality of the pulp can be gained. The factors involved are: degree of separation of the cellulose fibers; the average length of the separated fibers; and the amount and character of the fine material.

Later the use of the "blue glass" was introduced as a method for determining quality. The blue glass consists of a sheet of deep blue glass 6 by 6 in. or larger, held like a picture in a wooden frame. The glass is covered to a depth of about 1/16 in. with about 0.05 per cent dilute suspension of the pulp and examined as follows: the glass is slowly tilted and the ease with which the plup clots is noted; also the presence of fines and the average length of the fibers. By tapping the frame, the plup clots are broken up and the shives present may be easily seen. In the hands of an experienced observer a surprisingly good estimate of its various qualities can be made, but for a novice, care must be taken beforehand to have the consistency of the pulps approximately adjusted to the same value before comparisons are made.

Other very practical tests deserve mention as giving a clue to the possible quality of groundwood. One is the squeezing in the hand of a small quantity of pulp to a high consistency and noting the ease with which water is separated and, particularly, the pliancy of the resulting wad. It is more difficult to squeeze the water out of a slow pulp, and greater pliability denotes a higher quality and a slower pulp. Another practical test is to fold a sheet of pressed pulp double and examine the appearance of the outside of the bend—whether it is much broken or not—but again experience is necessary to allow for the ef-

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[1] Member TAPPI, Engineer and Technical Manager, Scott Paper Co., Chester, Pa.

fects of the thickness of the sheet and its moisture content.

In a grinder room it is possible for an operator to tell something of the quality of the pulp coming from the stones from the way the thick pulp flows, or rather tumbles, over the dam board across the grinder pit. A free pulp appears more crumbly than a slow pulp. The consistency of the stock influences this appearance but this factor may be allowed for by noting the depth of the pulp cake as it falls over the edge of the dam board and the rate at which it comes over.

### Numerical Tests

When the relatively excellent printing results on paper made almost wholly of good groundwood and at high speeds were realized, an appreciation of the possible savings by using lesser percentages of sulphite in the furnish became widespread; and a demand arose for a better and more exact, hence numerical, evaluation of groundwood qualities. This has been made possible by the development and use of freeness testers, sheet machines, and more recently by fiber classifiers. In this paper, the numerical results quoted are derived from the Canadian standard freeness tester and from *TAPPI* Standard T 205 m-38. For classification the original Clark pulp classifier was used, which was quick to operate and the results quite good. This apparatus has been briefly described by Brainerd *(1)*, but that paper is mainly concerned with a new and greatly improved instrument.

The most useful data concerning the nature of groundwood are as follows: (1) specific volume (proportional to the bulk of the test sheets); (2) burst factor or alternatively, the breaking length (proportional to the bursting test or to the tensile test, respectively, of a handsheet of a constant basis weight); (3) tear factor (proportional to the force necessary to tear a sheet of a constant basis weight); (4) drainage time (number of seconds which it takes the test sheet to form under standard conditions); (5) freeness (Canadian standard); (6) dirt area (part of equivalent black dirt per million of pulp surface), *TAPPI* suggested standard T 213 sm-36; (7) shive area (square millimeters of shives per 10 grams of pulp); (8) classification (percentage of pulp retained on a 35-mesh screen, through a 35-mesh screen and on a 150-mesh screen, and through a 150-mesh screen).

Interpretation of the various test results requires practice and the following notes may be helpful to the inexperienced.

### Specific Volume

The specific volume is the reciprocal of the density or apparent specific gravity of the test sheet and is the preferred form in the last revision of *TAPPI* Standard T 205 m-36. It is the volume in cubic centimeters occupied by one gram of paper under an applied pressure of about 7 lb. per sq. in. For most groundwoods the extreme figures lie between 1.8 and 3.0, the latter being a very coarse, bulky, free, long-fibered pulp, and the former a very finely ground, slow material. The average good grade of groundwood, suitable for newsprint, tests about 2.4 and for rotogravure and similar paper about 2.1. For comparison, unbeaten sulphite pulps have a specific volume of about 1.8 and a very well beaten sulphite pulp or a glassine paper about 1.0, i.e., 1.0 corresponds to a sheet which is solid, and for practical purposes, is devoid of air space between fibers, although cellulose itself has a specific volume of about 0.65.

The specific volume or an equivalent figure is not often mentioned in the literature although Doughty *(2)* and others have pointed out its value. The writer believes that this simple and reliable test, if performed under standard conditions, should be more widely used, as it is an excellent guide to the freeness of the pulp, and in conjunction with the burst, tensile, tear, and drainage time, it can, and should with advantage, be used as a modifying factor, as sometimes it may be misleading to consider results without it. For example, any pulp, chemical or mechanical, that has a high burst and high specific volume, is a good, long-fibered, tough pulp, whereas a pulp with a similarly high burst but a low specific volume is of a relatively poor quality comprising usually very short, fine, dense material. A little reflection will show its relation and value as applied as a modifier to the other physical tests. Application of this factor has been discussed before *(3)*.

### Burst, Tensile, and Tear Tests

Little further need be said of the burst factor or the breaking length, beyond the fact that they are both a measure of cohesion of the structure of the test sheet, the bursting test also including a measure of the stretch of the sheet. The stretch is a valuable quality index and a determination of both the tensile and a determination of the stretch, or percentage elongation of the test sheets, while somewhat more troublesome to carry out compared to making the bursting test in place of it, results in data permitting a better understanding of the quality. The range of burst factors of groundwoods is from 6 to 18, between 10 and 12 being more usual, and a total range of breaking lengths from 1000 to about 3800 meters.

The tearing factor is of doubtful value for normal groundwood except as a check, as it usually may be inferred quite accurately, with groundwood, from a consideration of both the tensile, or burst, and the specific volume. Tear factors for groundwood vary from 30 to 60.

### Drainage Time and Classification

Of the two tests, drainage time or the drainage factor and the freeness, the former is to be preferred as a more direct measure of the working qualities of stock on the paper machine. As a matter of fact, usually a reasonably good estimate of the freeness may be made with a given type of pulp by considering the drainage time and modifying it with the specific volume. Drainage time for groundwood vary from 6 to 60 sec., with corresponding Canadian standard freenesses of from 400 to 40 cc. although, as has been shown *(3)*, the relationship between various types of freeness testers is not at all good enough for practical purposes with widely different pulps. The tests for measuring the dirt area and the shive area were described some years ago[4, 5]. An unusually clean groundwood pulp has a dirt area of about 10 p.p.m. and a shive area of 20 sq. mm. per 10 grams.

### Classification

Finally the classification test has received much

attention during the past few years *(1, 6, 7, 8)*, and while the results are interesting it is believed that for groundwood they are more of value for research purposes than as a measure of quality; because, as will be shown later, it is not the amount of the fines, but their quality that matters. And all the important qualities of groundwood pulp as a whole are dominated by the quality of the finest particles present, but the rest of the various fractions, as determined by a classifier, constitute a rapid and excellent means for controlling quality *(1)*.

The table from experiment M of reference *(1)* is presented to illustrate the inter-relation of all these tests, Table I.

TABLE I.—PROPERTIES OF GROUNDWOOD SAMPLES FROM FOUR DIFFERENT SOURCES SUBMITTED TO MEET THE SAME SPECIFICATION

| Sample no. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Specific volume | 2.29 | 2.33 | 2.36 | 2.20 |
| Burst factor | 14.2 | 14.7 | 13.0 | 14.3 |
| Tear factor | 47 | 50 | 46 | 44 |
| Breaking length | 2730 | 2670 | 2410 | 2640 |
| Drainage time | 17.9 | 16.5 | 22.4 | 24.8 |
| Drainage factor | 22.5 | 24.3 | 25.9 | 28.4 |
| Freeness (Can. standard) | 104 | 105 | 92 | 68 |
| Shives—number | 76 | 63 | 181 | 104 |
| Shives—area | 17.7 | 14.6 | 42.9 | 25.3 |
| On 28 mesh | 11.2 | 14.0 | 20.6 | 20.0 |
| On 100 mesh | 38.6 | 35.0 | 24.6 | 26.2 |
| Through 100 mesh | 50.2 | 51.0 | 54.8 | 53.8 |

Samples 1 and 2 are seen to be and were superior to 3 and 4.

## The Effects of Beating on Groundwood

Many of the peculiar qualities and characteristics of groundwood may be learned from a study of the data in Table II from Kollergang beating tests *(9)*.

TABLE II.—BEATING OF FINELY GROUND NORWEGIAN SPRUCE

| | | | Revolutions per gram [1] | | | |
|---|---|---|---|---|---|---|
| Test | Initial | Unbeaten | 5 | 10 | 20 | 40 |
| Specific volume | 2.2 | 2.2 | 2.1 | 2.0 | 1.9 | 1.8 |
| Burst factor | 17.4 | 17.3 | 16.5 | 16.9 | 15.8 | 14.5 |
| Breaking length, M. | 3780 | 3600 | 3590 | 3590 | 3580 | 3550 |
| Tear factor | 47 | 48 | 45 | 39 | 33 | 25 |
| Drainage time, sec. | 28 | 28 | 30 | 34 | 39 | 52 |
| Freeness, cc. | 57 | .... | .... | .... | .... | 50 |
| On 35-mesh, per cent. | 28.6 | .... | .... | .... | .... | 15.4 |
| On 150-mesh, per cent. | 35.5 | .... | .... | .... | .... | 28.9 |
| Through 150-mesh, per cent | 35.9 | .... | .... | .... | .... | 55.7 |

[1] Each revolution per gram is equivalent to a refining action of between 40 and 80 h.p.-days per ton, depending on the efficiency of the refining installation.

For comparing the classification figures, an average unbeaten sulphite would give the following corresponding results: on 35-mesh, 67 per cent; on 150-mesh, 20 per cent; and through 150-mesh, 13 per cent.

It will be seen that the beating, which was carried out to a degree corresponding to an extremely well beaten sulphite sheet, approaching glassine, did not greatly affect the specific volume, the tear factor, nor the time. The absence of a marked reduction in the freeness, with beating, may at first sight seem odd, but it illustrates, as does the disproportionately high freeness reading of Sample 3 in Table I, a defect of the freeness tester and one which is not generally realized. It is explained by the fact, that if the fine material passes through the rather coarse screen commonly employed in the freeness tester, its presence cannot and does not affect the freeness reading. On the other hand, the fine wire used on the sheet machine retains the most of it, and, as expected, the drainage time increases substantially. In a paper machine stock system, while much of this fine material would pass through the wire, it is mostly returned to the headbox via the mixing well and undoubtedly would cause the beaten groundwood to work very much "slower" in practice. In Table III, with a more brittle fiber, the same effect is magnified.

TABLE III.—BEATING OF VERY FINELY GROUND SOUTHERN PINE

| | | | Revolutions per gram | | | |
|---|---|---|---|---|---|---|
| Test | Initial [1] | Unbeaten [2] | 5 | 10 | 20 | 40 |
| Specific volume | 2.6 | 2.5 | 2.4 | 2.3 | 2.2 | 2.0 |
| Burst factor | 11.1 | 12.1 | 11.3 | 10.8 | 10.7 | 10.9 |
| Breaking length, M. | 2280 | 2330 | 2270 | 2350 | 2390 | 2580 |
| Tear factor | 39 | 44 | 36 | 33 | 26 | 20 |
| Drainage time, sec. | 40 | 45 | 44 | 48 | 60 | 81 |
| Freeness, cc. | 25 | .... | .... | .... | .... | 72 |
| On 35-mesh, per cent. | 24.6 | .... | .... | .... | .... | 14.2 |
| On 150-mesh, per cent. | 28.3 | .... | .... | .... | .... | 25.7 |
| Through 150-mesh, per cent | 47.1 | .... | .... | .... | .... | 60.1 |

[1] Initial test performed on pulp after disintegrating 24 g. in 2 l. for 75,000 revs.
[2] Unbeaten test performed on pulp after disintegrating 66 g. in 2 l. for 75,000 revs.

Here the freeness actually goes up with beating from 25 to 72 cc., with shows the marked superiority of the drainage time determination and also shows the danger of attempting to express the quality of groundwood by a function of the freeness and bursting strength *(10)*. A more reliable guide for quality, apart from freeness, if a single numerical expression is desired, would be the product of the burst factor and the specific volume, but for evaluation purposes, proposals for calculating a single numerical figure for quality such as "strength factor" etc., would seem to add confusion to a difficult matter, and are to be deprecated.

As a final example a very good grade of newsprint pulp, having an initial Canadian standard freeness of 85 cc. was subjected to the same treatment, Table IV.

TABLE IV.—BEATING OF NEWSPRINT GRADE OF CANADIAN SPRUCE

| | | | Revolutions per gram | | | |
|---|---|---|---|---|---|---|
| Test | Initial | Unbeaten | 5 | 10 | 20 | 40 |
| Specific volume | 2.3 | 2.4 | 2.2 | 2.1 | 2.0 | 1.9 |
| Burst factor | 12.3 | 13.4 | 13.9 | 13.2 | 12.1 | 11.9 |
| Breaking length, M. | 2790 | 2760 | 2950 | 2870 | 2800 | 2970 |
| Tear factor | 43 | 41 | 37 | 31 | 28 | 23 |
| Drainage time, sec. | 18 | 22 | 23 | 26 | 31 | 40 |

Because of the lack of time, neither the freeness nor the classifications were determined. Note that the burst factors of the examples seem to diminish uniformly on continued beating but that the tensile strengths remains more or less constant. From this we may infer that the beaten sheets had become more brittle, i.e., had less stretch.

All the data given above show that beating does not appreciably improve the "quality" of at least fairly slow groundwood pulps; and, except possibly for removing lumps and perhaps making the stock a trifle slower, the refining of such groundwoods does not do any good. There are less expensive ways for removing lumps from groundwood than by using power to refine vigorously, the whole batch.

## Effect of Fines on Groundwood Qualities

To show the effect of the finest material in groundwood the Tables V and VI are of interest.

Sufficiently large quantities of two unbeaten groundwoods, similar to that in Table II, were classified and test sheets were made from the fractions retained on the 35-mesh screen and the fractions passing the 35-mesh but retained on the 150-mesh screen. Forty-five per cent of pulp A passed through the 150-mesh screen and 38.3 per cent of pulp B passed through the 150-mesh screen. These results were compared with those of sheets made from the entire pulps which also, of course, contained the

finest material which passed through the 150-mesh screen as stated.

TABLE V.—TEST RESULTS OF FRACTIONATED GROUNDWOOD

| | Pulp A | | | Pulp B | | |
|---|---|---|---|---|---|---|
| | Entire pulp | On 35-mesh | On 150-mesh | Entire pulp | On 35-mesh | On 150-mesh |
| Specific volume | 2.2 | 2.8 | 2.6 | 2.2 | 2.8 | 2.5 |
| Burst factor | 16.8 | 9.8 | 10.2 | 13.0 | 6.5 | 7.1 |
| Breaking length, M. | 3300 | 1830 | 1870 | 3100 | 1350 | 1750 |
| Tear factor | 39 | 44 | 42 | .... | .... | .... |
| Drainage time, sec. | 51.0 | 5.2 | 5.5 | 16.0 | 5.5 | 6.0 |
| Percentage of pulp tested | 100 | 23.1 | 31.9 | 100 | 27.4 | 34.3 |

The paramount importance on quality of the fines which have been lost through the 150-mesh screen is clearly seen, in the very marked loss in strength and the appreciable increase in specific volume, indicating a removal of much of the cementing material. Under these circumstances, as might be expected, the tear is not appreciably affected.

In 1928, Per Klem, then engineer for the Norsk Traemassekompani (Norwegian Groundwood Association) carried out an extensive research on the properties of groundwood and some of his results *(11)*, which are similar to the above, are quoted in Table V. Several groundwoods of widely different quality were separated into "flour," which consisted of between 60 and 70 per cent of the entire pulp, and "fiber," the remaining course fibers.

Three Norwegian groundwood pulps, each of which however was coarser than those in Table V, were fractionated with a Hurums apparatus, one of the earliest classifying instruments, a single 66-mesh double twill wire being used for the screen which was similar in separating effect to about a 100-mesh plain weave wire.

TABLE VI.—BREAKING LENGTH IN METERS OF "FLOUR" AND "FIBER" MIXTURES

| Flour per cent | Fiber per cent | Pulp A | Pulp B | Pulp C |
|---|---|---|---|---|
| 100 | 0 | 2975 | 2335 | 2020 |
| 90 | 10 | 3560 | 2385 | .... |
| 80 | 20 | 3200 | 1990 | 2015 |
| 70 | 30 | 2875 | 2130 | .... |
| 60 | 40 | 2710 | 2037 | 1590 |
| 40 | 60 | 2000 | 1755 | 1245 |
| 20 | 80 | .... | 878 | .... |
| 0 | 100 | 503 | 220 | 450 |

From the data in the above two tables, it is obvious that the quality of the fines is the controlling factor, and not the quantity. Furthermore, the quality of the coarser portion of the pulp has but little to do with the final results. Some very interesting experiments were also carried on by Klem by blending the "flour" from one pulp with the "fiber" from another, thus making synthetic pulps which sometimes bore only a remote resemblance in quality to the pulps from which they were made.

## The Blending of Pulps

Similarly, upon blending a groundwood and a sulphite pulp together, the test results of the mixture are by no means predictable from tests as ordinarily carried out on the pulps before mixing. This and also the blending of ground wood pulps have been briefly discussed in another paper *(12)*. In the writer's experience, the "blending quality" of a pulp is a most important one and upon one occasion, a noticeably poor performance in the mill of a groundwood pulp which had a normal strength test was afterwards directly traceable to its inability to blend well with the sulphite pulp, a 50-50 mixture having no more strength, except tear, than the groundwood alone.

Tests as usually made, may be very deceptive; for example, compare the tests of the "on 150-mesh" fraction of pulp A in Table V, which had passed a 35-mesh screen with the initial test of the southern pine pulp in Table III. For reasons mentioned, the freenesses of these pulps might have been the same. The only appreciable difference would then have been in the drainage time and the classification.

## Two Good Methods

There are two good ways of being reasonably sure of the quality of any kind of pulp compared with an established quality: one, to obtain comparable test results in classification, in specific volume, and in burst factor or breaking length with the other; and the second way would be to blend the sample with a suitably beaten sulphite or other pulp with which it is to be used and to obtain results similar to those after the same procedure with the known sample. As may be gathered from what has been said, it is necessary to insure that the retention of the fines in the sheet-making equipment is about the same as that in the mill system—not the fourdrinier part, which usually means a retention of at least 95 per cent, and may necessitate the reuse of white-water for forming each successive test sheet.

## The Qualities of Groundwood

A proportion of suitable and good groundwood in a sheet of paper aids the opacity and improves the printing quality, helps formation of the sheet, improves the bulk, and lowers the cost of the furnish. A quantity of unsuitable groundwood weakens the sheet, adds shives and dirt, and does not help formation. The only drawback to a good groundwood as a constituent of the furnish is its relatively poor color, although bleaching with sodium hydrosulphite may improve this markedly for several months, and also its content of noncellulosic material, which results in deterioration of the color, and often the strength of the sheet, with age.

The evaluation of the quality of any pulp is far from a simple matter, and there is still much to learn, especially concerning the fundamental principles involved in the structure of a sheet of paper.

## Literature Cited


(1) Brainerd, Forrest W. A new fiber classifier and its applications. *Paper Trade J.* 108, no. 16: 33-40 (April 20, 1939); *Tech. Assoc. Papers* 22: 205-212 (1939).

(2) Doughty, R. H. The relation of sheet properties and fiber properties in paper. *Paper Trade J.* 93, no. 2: 39-44 (July 9, 1931); 93, no. 15: 44-49, 54 (Oct. 9, 1931); 94, no. 9: 29-34 (Mar. 3, 1932); 94, no. 24: 31-33 (June 16, 1932); 95, no. 10: 31-38 (Sept. 8, 1932); *Tech. Assoc. Papers* 16: 460-467 (1933).

(3) Clark, James d'A. Concerning the interpretation of pulp tests. *Paper Trade J.* 104, no. 8: 146-148 (Feb. 25,, 1937); *Tech. Assoc. Papers* 20: 187-189, 1937.

(4) Clark, James d'A., Hazmburg, R. S., and Knoll, R. J. The estimation of dirt and shives in pulp and paper. *Paper Trade J.* 96, no. 5: 40-44 (Feb. 2, 1933).

(5) TAPPI Standard T 213 sm-36.

(6) Hart, J. S., Patton, H. R., and Johnston, H. Wyatt. The classification of pulp by selective screening. *Pulp Paper Mag. Canada* 32: 252-257 (Feb. 25, 1932).

(7) Kress, Otto, and Brainerd, Forrest W. A study of wood pulp fractionation. *Paper Trade J.* 98, no. 13: 35-39 (March 29, 1934).

(8) Somerville, J. L. A tentative standardization of a fractionating screen for coniferous mechanical pulps. *World's Paper Trade Rev.* 97, no. 4: 263, 264, 266, 268, 270, 304, 306, 308 (Jan. 22, 1932).

(9) Clark, James d'A. Kollergang beating method of pulp evaluation. *Paper Trade J.* 100, no. 11: 36-44 (March 14, 1935).

(10) Patterson, H. A. Groundwood quality expressed by freeness and bursting strength. *Pulp Paper Mag. Canada,* convention issue, 1936, pp. 79-80.

(11) "Slyseriforsok," treatise no. 5, from Norwegian Paper Industry Research Committee, 1929 (private publication).

(12) Jones, G. D. O., Ross, T. W., and Johnston, H. Wyatt. Fiber strength aspects. *Proc. Tech. Section,* Can. Pulp Paper Assoc., 19th Annual meeting, p. 63 (June, 1933).

# Influence of Paperboard and Adhesives on Strength Properties of Corrugated Fiberboards*

By D. W. McCready[1]


## Abstract

*Seven series of corrugated fiberboards made from different paperboards and with different adhesives were evaluated by beam and column test procedures. The stiffness factors EI were computed. The influences of the paperboards on the physical properties of the fiberboards were not clearly revealed. The influences of the adhesives were revealed, and in most instances the adhesives appeared to have greater influence on the physical properties of the corrugated board than any other factor, with the exception of poor fabrication. A method of fatigue testing of corrugated board involving the flexing of beams of it is presented and discussed.*


Interest in the physical properties of corrugated fiberboard has been prompted by the considerations that corrugated fiberboards are physical structures, and that evaluations of pertinent physical properties of the boards may be used to establish improved evaluation, fabricating, and utilization procedures *(1, 2, 3)*. The physical properties of a corrugated fiberboard may be considered a summation of properties to which each of the components of the board contributes in part. Thus the influences of the paperboards used and the adhesives used, in the fabrication of corrugated boards, may be considered separate items capable of separate evaluation.

The physical reactions of a structure are determined by the intrinsic properties of the structure, namely, the modulus of elasticity $E$, the moment of inertia $I$, and the extensive factors involved, such as dimensions and forces. The intrinsic properties are considered fundamental properties and therefore may be used in comparisons of the physical properties of different structures.

Separate determinations of the moduli of elasticity and moments of inertia are preferable but not imperative. Separate determinations in the case of corrugated fiberboards are not entirely satisfactory. In the formulations of most structures the modulus of elasticity and moment of inertia are found together as $EI$, which in this combined form may be considered a stiffness factor. Determinations of $EI$ can be made rather readily in the case of corrugated boards, and thus this stiffness factor may be used as a means of evaluating fundamental physical properties of corrugated boards.

This paper reports the values obtained by beam and column tests on corrugated fiberboards, the computed stiffness factors and a discussion of the data. Also reported are results obtained with tests in which beams were subjected to flexing loads.

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[1] Member TAPPI, Associate Professor of Chemical Engineering, University of Michigan, Ann Arbor, Mich.

## Materials

Five different sets of liner boards and of corrugating boards were used to fabricate seven series of corrugated fiberboards, of which six series were A-flute boards and one series B-flute boards. Each series contained boards made with each of two or more different adhesives. The adhesives used were silicate, silicate-clay and starch.

A description of the paperboards used and averaged results of tests on the boards are given in Table I. The test results were obtained on samples taken at the beginning and end of each run. Properties of the board were uniform throughout a run.

The corrugated fiberboards were made on commercial machines by the usual operators. The machines operated previous to the test runs with starch or combined starch and silicate adhesives. During the manufacture of the test boards, machine adjustments remained nearly uniform and operating speeds were kept uniform. The combinations of paperboards used, the adhesives used, the clearances on adhesive transfer rolls or doctors, and the operating speeds are given in Table II.

## Testing Procedures

All tests reported were made in an atmosphere controlled to conditions of 70 deg. F. and 50 per cent relative humidity. Samples were preconditioned 24 hr. in an atmosphere which approximated 40 per cent r. h. and they were finally conditioned at least 48 hr. at the testing conditions.

Caliper, basis weight, and bursting strength determinations were made according to recognized procedures. Crush tests on the paperboards were made on cylindrical columns 0.5 in. high and 6 in. in circumference.

Beam tests, except for boards in Series 5 and 6, were made on a Schopper tensile test machine, which was adapted with a beam testing fixture. This fix-

TABLE I.—UNCOMBINED PAPER BOARDS.

| Designation | Description | Caliper | Basis-wgt. | Bursting strength | Crush Test: Cross direction | Crush Test: Machine direction |
|---|---|---|---|---|---|---|
| | | in. | lb. | pt. | lb. | lb. |
| | Liner Boards | | | | | |
| 1L | Fourdrinier kraft | 0.0161 | 49.4 | 111 | 73.0 | 51.0 |
| 2L | Fourdrinier kraft | 0.0162 | 51.0 | 123 | 79.5 | 63.0 |
| 3L | Fourdrinier kraft | 0.0163 | 53.1 | 137 | 73.0 | 57.0 |
| 4L | Cylinder jute | 0.0171 | 62.2 | 115 | 102.7 | 58.0 |
| 5L | Fourdrinier kraft | 0.0163 | 44.0 | 112 | 70.7 | 56.0 |
| | Corrugating Boards | | | | | |
| 1C | Chestnut | 0.0113 | 31.7 | 32 | 37.0 | 29.0 |
| 2C | Strawboard | 0.0101 | 34.4 | 23 | 31.0 | 23.0 |
| 3C | Chestnut | 0.0107 | 32.5 | 34 | 32.0 | 31.0 |
| 4C | Strawboard | 0.0108 | 34.6 | 23 | 27.0 | 21.5 |
| 5C | Fourdrinier kraft | 0.0098 | 26.8 | 86 | 34.5 | 20.5 |

TABLE II.—COMBINED BOARDS

| Designation | Paperboards | Flutes | Adhesive | Roll Clearances: Single facer in. | Roll Clearances: Double backer in. | Machine speed ft./min. | Bursting strength pt. |
|---|---|---|---|---|---|---|---|
| 1KCX | Liner (1L) Kraft | A | Silicate | 0.008 | 0.010 | 200 | 265 |
| 1KCZ | Corr. (1C) Chestnut | A | Starch | 0.008 | 0.010 | 200 | 278 |
| 2KSY | Liner (2L) Kraft | A | Silicate-clay | 0.0095 | 0.0105 | 150 | 344 |
| 2KSX | Corr. (2C) Straw | A | Silicate | 0.0095 | 0.0105 | 150 | 328 |
| 2KSZ | | A | Starch | 0.0095 | 0.0105 | 150 | 333 |
| 3KCX | Liner (3L) Kraft | A | Silicate | 0.011 | 0.010 | 185 | 326 |
| 3KCZ | Corr. (3C) Chestnut | A | Starch | 0.010 | 0.0085 | 185 | 328 |
| 4JSX | Liner (4L) Jute | A | Silicate | 0.008 | 0.012 | 110 | 286 |
| 4JSZ | Corr. (4C) Straw | A | Starch | 0.016 | 0.011 | 110 | 285 |
| 5KKX | Liner (5L) Kraft | A | Silicate | 0.0115 | 0.009 | 110 | 223 |
| 5KKY | Corr. (5C) Kraft | A | Silicate-clay | 0.0115 | 0.009 | 110 | 222 |
| 5KKZ | | A | Starch | 0.0115 | 0.009 | 110 | 244 |
| 6KKX | Liner (5L) Kraft | A | Silicate | 0.019 | 0.019 | 110 | 229 |
| 6KKY | Corr. (5C) Kraft | A | Silicate-clay | 0.019 | 0.019 | 110 | 223 |
| 6KKZ | | A | Starch | 0.019 | 0.019 | 110 | 241 |
| 7KSY | Liner (2L) Kraft | B | Silicate-clay | 0.0095 | 0.0105 | 150 | 310 |
| 7KSX | Corr. (2C) Straw | B | Silicate | 0.0095 | 0.0105 | 150 | 301 |
| 7KSZ | | B | Starch | 0.0095 | 0.0105 | 150 | 320 |

ture incorporated a dial micrometer for measuring deflections. The speed of descent of the lower part was 0.5 in. per minute. Beams were loaded in the center. In making a test the dial micrometer was set at zero when the load was 0.25 pound. The deflection to this load was obtained by plotting the load-deflection data and extrapolating the line to the zero load value. The samples used were cut 3 in. wide and 14 in. long. These were tested as 12-in. beams with 1 in. overhang beyond each of the end supports. The beams of fiberboards in Series 5 and 6 were tested on an apparatus previously described *(2)*.

Column tests on corrugated board were made on a tester which has been previously described *(2)*. This tester was modified to accommodate columns up to 12 in. in length. The columns were tested with flat and free ends.

Flexing tests were made on the beam testing apparatus previously described *(2)*. The deflection indicating device was removed. A flexing load was obtained by alternately raising and lowering the pail, which, with additional lead shot, comprised the load. This was done by a platform which was raised and lowered by a cam. The travel of the platform was adjusted so that all load on the beam was released, when the platform was at the top of the cycle, and the load was applied as the platform approached the bottom of the cycle.

All samples of corrugated board were cut and tested so that the influences of fingerlines were reduced to a minimum.

## Data and Discussion

### Beam Data

The results of the beam tests are presented in Table III and in Fig. 1 and 2. The data on board Series 5 and 6 are not complete, due to the fact that the previous method of making the beam tests was not precise enough to warrant reporting omitted values.

In Fig. 1 are plotted the load-deflection curves obtained with beams which were tested with corrugations parallel to beam length. The plotted data are averages of results obtained when the beams were tested with the single face and double back sides concave. The curves show characteristic features. As load is increased from zero, deflection increases in direct proportion until the proportional limit is reached. This is the elastic range. At load values greater than the proportional limit load, deflection increases at a proportionately greater rate until failure occurs.

In Fig. 2 are plotted similar load-deflection curves obtained with beams which were tested with corrugations perpendicular to beam length and single face side concave. The proportional limit under

TABLE III.—RESULTS OF BEAM TESTS

| Corrugations Concave side Board | Ultimate Values 3 x 12 in. Beams: Load: Parallel single face lb. | Load: Parallel double face lb. | Load: Perpendicular single face lb. | Deflection: Parallel single face lb. | Deflection: Parallel double face in. | Deflection: Perpendicular single face in. | Proportional limit Parallel ave. |
|---|---|---|---|---|---|---|---|
| 1KCX | 4.56 | 5.20 | 2.80 | 0.743 | 0.877 | 0.252 | 2.2 |
| 1KCZ | 4.12 | 3.55 | 2.47 | 0.811 | 0.641 | 0.257 | 2.1 |
| 2KSY | 5.93 | 4.47 | 2.89 | 0.763 | 0.708 | 0.250 | 2.9 |
| 2KSX | 5.69 | 5.28 | 3.25 | 0.753 | 0.706 | 0.264 | 3.0 |
| 2KSZ | 4.29 | 4.01 | 2.65 | 0.672 | 0.606 | 0.274 | 2.3 |
| 3KCX | 4.52 | 4.42 | 2.89 | 0.575 | 0.613 | 0.221 | 2.5 |
| 3KCZ | 3.80 | 3.94 | 2.83 | 0.556 | 0.537 | 0.227 | 2.2 |
| 4JSX | 4.16 | 5.62 | 4.85 | 0.897 | 1.467 | 0.297 | 2.0 |
| 4JSZ | 4.06 | 3.85 | 4.00 | 1.208 | 1.040 | 0.268 | 1.7 |
| 5KKX | 4.93 | 5.49 | 3.03 | 0.72 | 0.80 | 0.29 | |
| 5KKY | 5.22 | 5.90 | 2.93 | 0.77 | 0.84 | 0.27 | |
| 5KKZ | 4.53 | 4.19 | 2.60 | 0.84 | 0.72 | 0.29 | |
| 6KKX | 5.67 | 5.82 | 3.30 | 0.83 | 0.99 | 0.32 | |
| 6KKY | 5.97 | 6.67 | 3.21 | 0.83 | 1.07 | 0.30 | |
| 6KKZ | 4.29 | 4.58 | 2.54 | 0.78 | 0.88 | 0.28 | |
| 7KSY | 3.00 | 3.12 | 2.25 | 1.113 | 1.185 | 0.466 | 1.3 |
| 7KSX | 3.15 | 3.47 | 2.75 | 1.195 | 1.335 | 0.547 | 1.8 |
| 7KSZ | 2.65 | 2.37 | 1.94 | 1.296 | 1.114 | 0.432 | 1.2 |

these conditions is not clearly indicated in most cases, as it is close to the ultimate strength value.

In Table III the results of the beam tests are summarized. The ultimate load and deflection values are given for beams tested in three orientations. The proportional limit loads, as determined from Fig. 1, are given. These loads were determined from the original plot of the data and are more precise than values indicated in Fig. 1. The use of averaged values of the results obtained when beams are tested with single face and double back sides concave is justified within the elastic limit, but as indicated by the ultimate values, such averaged values are not precise beyond the proportional limit.

### Column Data

The results of the column tests are given in Table IV and plotted in Fig. 3. The column lengths used were 2, 4, 6, 8, and 12 in. with corrugations vertical and 2, 4, 8, and 12 in. with corrugations horizontal. The width of the columns was 4 inches. The data plotted in Fig. 3 show the critical loads withstood by the columns of corrugated board as functions of the lengths of the columns. The lines are drawn straight, although the plots should be curves at column lengths of about 12 inches.

### Discussion

The data from the beam and column tests offer several bases for comparisons of some of the factors influencing the strength of corrugated boards. However, comparisons between series of the boards must also consider other conditions. The different series of boards were made on different machines. Boards in Series 3 were made with a machine which gives in effect two fingerlines which alternate on the sides of the boards about 2 in. apart. Boards in Series 4 were not well made for they showed areas of spotty or missing adhesion between corrugating and liner boards. Boards in Series 6 were made with greater than normal amounts of adhesives. Boards in Series 7 are B flute boards. The fiberboards within a series are comparable, as machine conditions were uniform, thus comparisons may be made of the influences of the adhesives on properties of the corrugated boards.

The influences of the various combinations of paperboards on the ultimate test values of the corrugated fiberboards is not fully revealed. Comparisons of the ultimate test values obtained on the corrugated boards in Series 1, 2, 3, 4, and 5 reveal that, for comparable boards, no one combination of

TABLE IV.—RESULTS OF COLUMN TESTS; WIDTH OF COLUMNS, 4 IN.

| Corrugations Length of column | Ultimate load, lb. Vertical 2 | 4 | 6 | 8 | 12 | Horizontal 2 | 4 | 8 | 12 |
|---|---|---|---|---|---|---|---|---|---|
| Board | | | | | | | | | |
| 1KCX | 184 | 155 | 100 | 95.2 | 35.4 | 66.7 | 63.3 | 67.8 | 45.0 |
| 1KCZ | 150 | 135 | 97 | 78.2 | 29.3 | 66.2 | 56.0 | 52.0 | 43.7 |
| 2KSY | 170 | 167 | 127 | 103 | 38.2 | 57.8 | 62.0 | 62.0 | 52.4 |
| 2KSX | 174 | 161 | 130 | 104 | 43.8 | 66.3 | 58.1 | 61.2 | 48.0 |
| 2KSZ | 153 | 141 | 100 | 86 | 35.3 | 52.1 | 57.5 | 63.8 | 45.2 |
| 3KCX | 166 | 136 | 103 | 96.8 | 43.7 | 62.3 | 64.6 | 65.8 | 47.7 |
| 3KCZ | 125 | 111 | 67.3 | 64.7 | 30.1 | 65.1 | 65.5 | 74.0 | 53.5 |
| 4JSX | 172 | 172 | 134 | 96.1 | 38.2 | 79.9 | 73.0 | 73.5 | 55.1 |
| 4JSZ | 174 | 146 | 104 | 77.5 | 29.3 | 82.5 | 73.6 | 77.5 | 64.2 |
| 5KKX | ... | 172 | ... | ... | ... | ... | 73.0 | ... | ... |
| 5KKY | ... | 194 | ... | ... | ... | ... | 88.3 | ... | ... |
| 5KKZ | ... | 153 | ... | ... | ... | ... | 73.0 | ... | ... |
| 6KKX | ... | 209 | ... | ... | ... | ... | 71.7 | ... | ... |
| 6KKY | ... | 222 | ... | ... | ... | ... | 84.5 | ... | ... |
| 6KKZ | ... | 161 | ... | ... | ... | ... | 69.0 | ... | ... |
| 7KSY | 151 | 88 | 42.5 | 29.8 | 10.7 | 78.7 | 80.0 | 45.0 | 22.1 |
| 7KSX | 152 | 102 | 46.3 | 30.5 | 10.9 | 81.0 | 69.3 | 40.2 | 22.6 |
| 7KSZ | 145 | 88 | 37.4 | 27.9 | 9.7 | 82.5 | 63.2 | 39.2 | 20.9 |

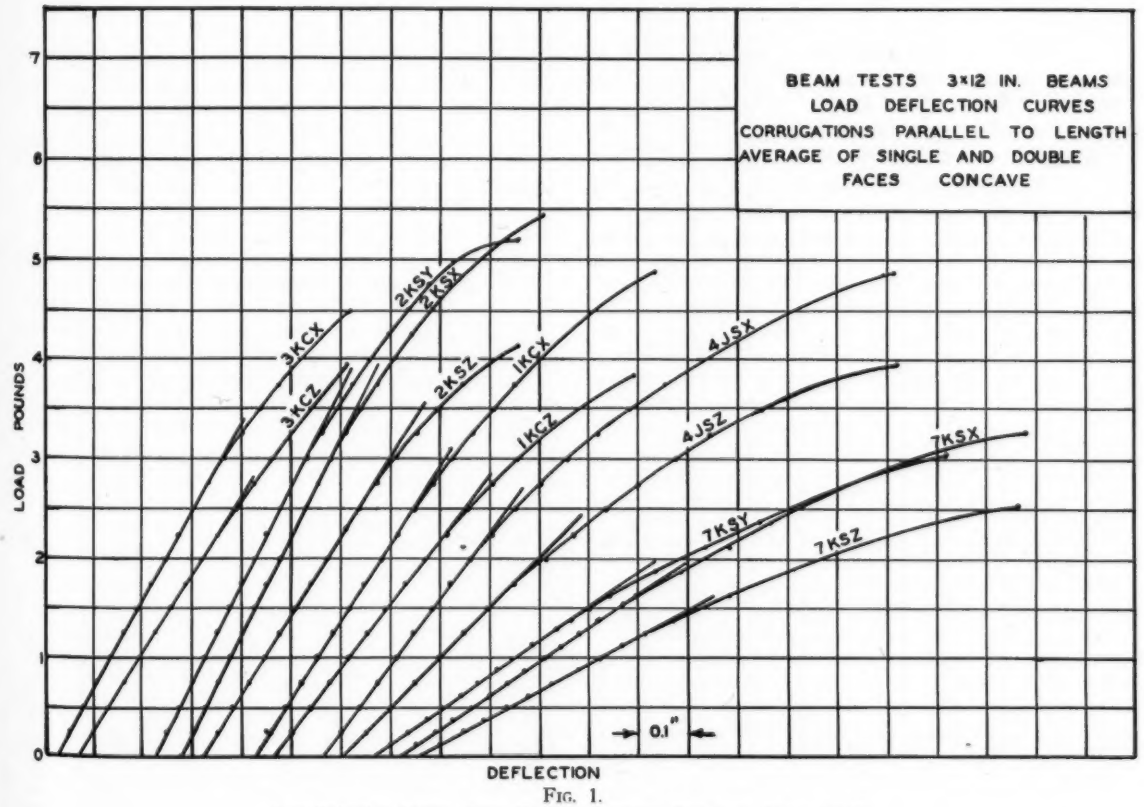


FIG. 1.

Load-Deflection Curves, Beam Test, Corrugations Parallel to Beam Length.

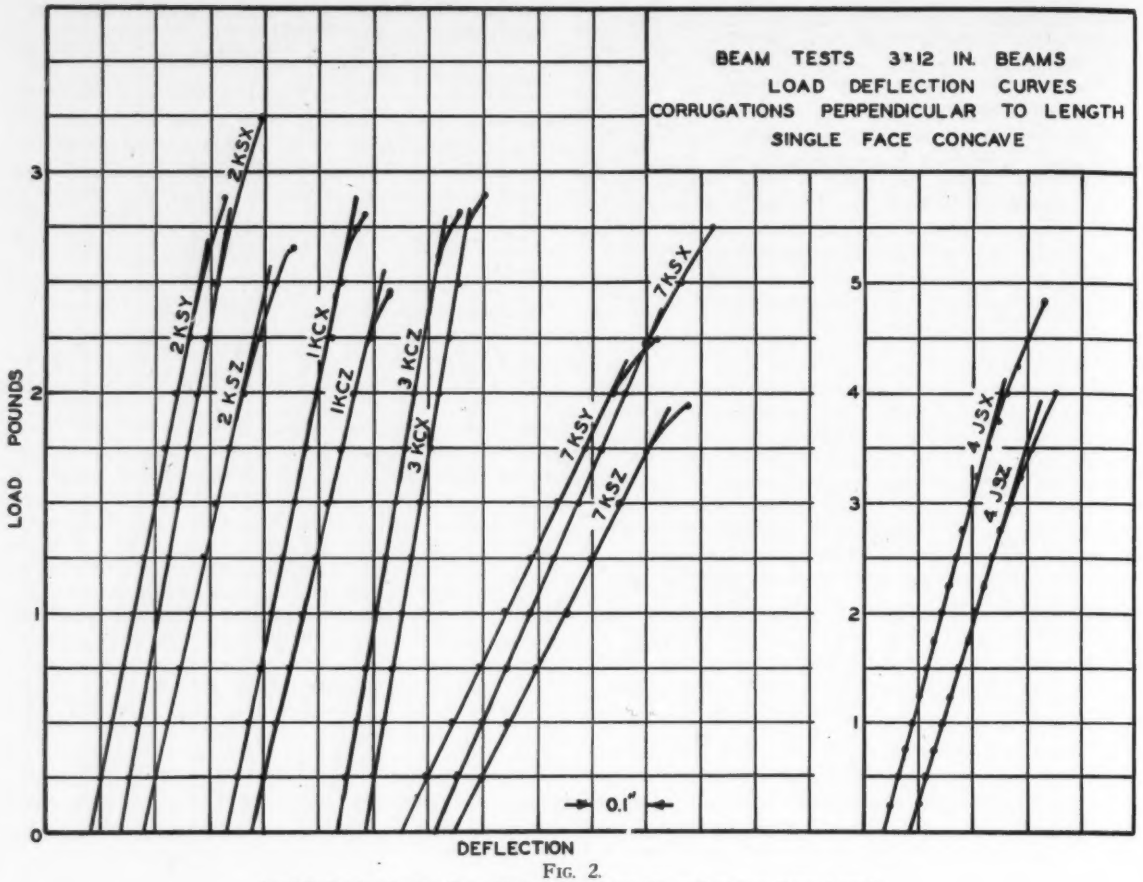


FIG. 2.
Load-Deflection Curves, Beam Test, Corrugations Perpendicular to Beam Length.

paperboards was predominantly stronger than other combinations in all tests. The boards in Series 5 appear to be the strongest on an average. These boards were very well made. The boards in Series 4 were exceptionally strong when tested as beams with corrugations perpendicular to beam length.

The influences of the adhesives used in the manufacture of the corrugated boards, on ultimate strength characteristics of the boards, are readily apparent. Comparisons between silicate and silicate-clay adhesives, Series 2, 5, 6, and 7, show that in two instances corrugated boards made with silicate-clay adhesives are apparently stronger than comparable boards made with silicate adhesives, but the reverse is apparent in the other two instances. Comparisons between boards made with starch adhesives and boards made with either silicate or silicate-clay adhesives in all the series, show that the boards which were made with either of the silicate adhesives were always stronger than the comparable boards made with starch adhesives, except when the boards were tested as short columns with corrugations horizontal. The results of the latter tests do not show definite differences, which is to be expected as failures occurred due to telescoping between glue lines.

### Stiffness Factor

The stiffness factors *EI* computed from beam and column data are given in Table V.

The values of *EI* from the beam data were computed with the formulation for center loaded beams:

$$EI = \frac{P\,l^3}{48\,\Delta}$$

For the computation of *EI* per in. of beam width when the beam length *l* equals 12 in., the formula reduces to:

$$EI = \frac{12\,P}{\Delta},$$

where *P* equals the load on the beam in pounds, and $\Delta$ the consequent deflection in inches.

Values of *EI* were computed for the elastic limit by determining the slope of the load-deflection curves in Figs. 1 and 2 during this interval. Values of *EI* at rupture were computed from rupture loads and deflections.

The values of *EI* from column data were computed with Euler's formulas for columns with hinged ends:

$$EI = \frac{P\,l^2}{\pi^2}$$

For the computation of *EI* per in. of column width the formulas reduces to:

$$EI = \frac{P\,l^2}{39.5},$$

where *P* is the critical load on the 4-in. wide columns and *l* equals the length of the column in inches.

The stiffness factors, *EI* values, computed from the beam test data and reported in Table V include the influences of deflection due to both bending and shear. For comparative purposes it is not considered necessary to separate these influences if the 12-in. beam length is considered a representative

length. The *EI* values computed from the column data vary with column length, thus some of them are not true values. Points of inflection were observed in some of the columns during testing, thus the testing conditions were not equivalent to hinged end conditions. Also, all of the columns 2 in. long, part of the columns 4 in. long tested with corrugations vertical, and all of the columns 4 and 8 in. long tested with corrugations horizontal, failed by telescoping, which indicates that with these columns the critical stress exceeded the proportional limit. Evidently columns must be 12 in. or more in length before Euler's formulas fit the data and to give curves on plots of critical load versus column length such as Fig. 3.

Comparisons of the *EI* values computed from beam and column data indicate, that in most cases, the columns which were 6 in. long and tested with corrugations vertical, gave *EI* values comparable to those obtained within the elastic limit range in the beam tests, when the beams were tested with corrugations parallel to beam length. Likewise, a column about 5 in. long would have given values comparable to the rupture values obtained with the beam test. A similar comparison between columns tested with corrugations horizontal and beams tested with corrugations perpendicular to beam length is possible only with columns 12 in. or more in length.

The stiffness factors computed from column data are proportional to the ultimate critical load values. This is not the case with the stiffness values computed from beam test data for the differences in the amounts of deflection of the beams influence this relationship. Thus the stiffness factors computed from beam data may be considered more critical and more comparative.

The values of the stiffness factors show the same general conclusions that were stated above, namely, that no one combination of paperboards produced the stiffest fiberboards under all test conditions, and that for comparable boards, the boards made with silicate and silicate-clay adhesives in most instances had about the same stiffness, and the boards made with either of the silicate adhesives were stiffer than the boards made with the starch adhesives. If it is considered that the best index of the stiffness of fiberboard is the *EI* value computed from the elastic limit data on a beam tested with corrugations parallel to beam length, and this should be true for adhesive comparisons, then it appears as if the adhesive used had, in most instances, greater influence on the stiffness of the corrugated board than did the paperboards from which the corrugated board was made. The *EI* values computed from other orientations and tests also tend to confirm this. Another important factor is of course the quality of the fiberboard and those boards which were poorly made, Series 4 are not as stiff as the others.

### Flexure Testing

The desire to measure fatigue characteristics of corrugated fiberboards led to the testing of boards with flexing loads. The testing of beams under such loads has proved the most feasible. In the test pro-

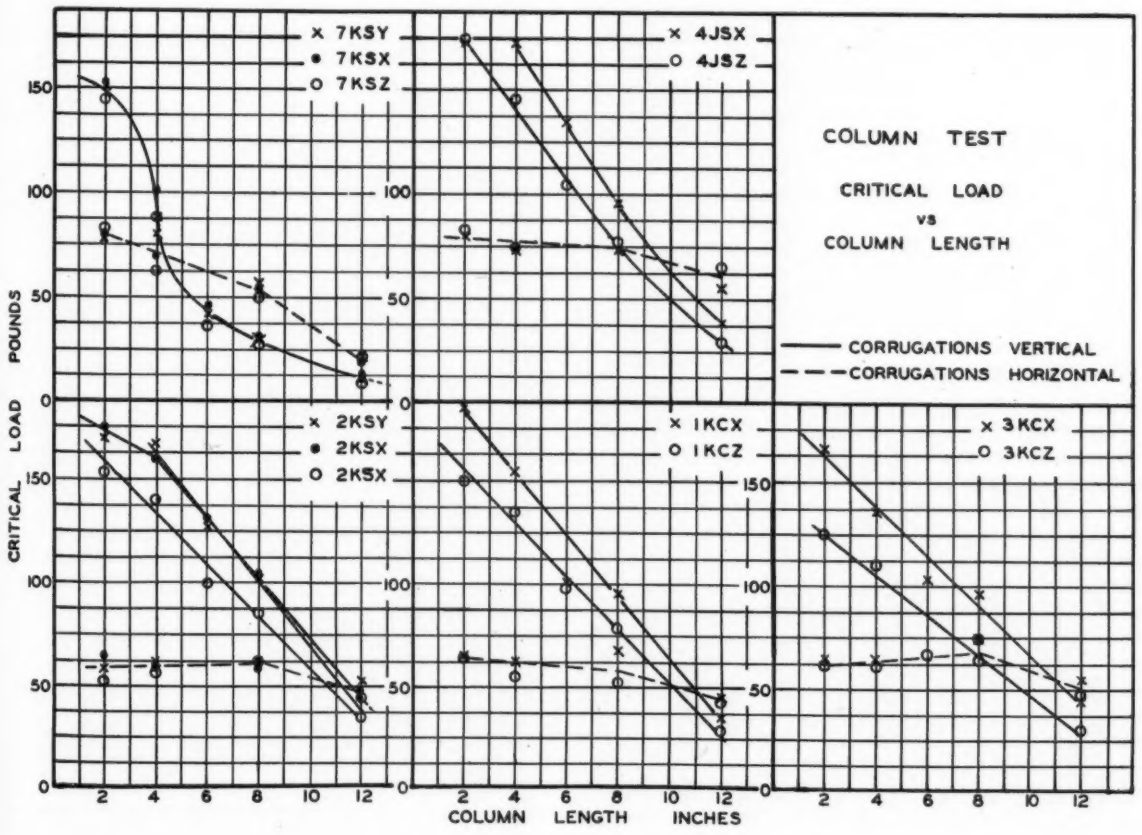


FIG. 3.
Column Test, Critical Loads Versus Column Length.

cedures a load, which is less than the ultimate test load on the board, is repeatedly applied to the center of a beam and then released until rupture occurs. The number of cycles, with a given load, is considered a measure of resistance to flexure. All test runs were stopped, without failure of the beam, if the number of cycles exceeded 10,000.

As the loads used in the flexure test were greater than the proportional limit loads and great enough to cause ultimate failure of the board under steady load conditions, a series of steady load and flexing load tests were made to establish the effects of flexing. These tests were made on selected samples to assure nearly uniform samples. The results are given in Table VI and reported as minutes of duration of the two tests. The actual time the load is fully applied in the flexure test is about 20 per cent of the times reported.

TABLE VI.—FLEXING AND STEADY LOADS

| Load | Test duration, min. | | | | | |
|---|---|---|---|---|---|---|
| Flexing | 0.6 | 6.5 | 25.0 | 42.6 | 118 | 135 |
| Steady | 11.0 | 42.5 | 294 | 360 | 522 | 1280 |

These results indicate that the flexing of the board does reduce its ability to withstand loads.

The results of the flexure tests are given in Table VII. Values are reported both for flexure with constant load and for flexure with a load of about the same percentage of the ultimate load. The beams were flexed with single face concave and corrugations parallel to beam length. The results of the flexure tests are comparable only in respect to the type of adhesive used in the manufacture of the corrugated boards. The data obtained with comparable boards in Series 1 and 2 show that with equal flexing loads of 4.0 and 3.65 pounds respectively, those boards manufactured with silicate and silicate-clay adhesives withstood a much greater number of flexes than the boards manufactured with the starch adhesives. Similar results were not obtained with the boards in Series 4, because ultimate load values were nearly the same for these boards, and because in all but two of the samples of board 4JSX there were one or more glue lines at which there were no contacts between liner and corrugating boards. There is evidence that the flexing test may serve as a very good indication of the quality of fabrication of corrugated fiberboards. Board 3KCZ

TABLE VII.—FLEXURE TESTS ON CORRUGATED BOARDS. RATE OF FLEXURE—40 CYCLES PER MIN.

| Board | Ultimate load | Flexing load lb. | Percentage of ultimate | Number of flexes | Flexing load lb. | Percentage of ultimate | Number of flexes |
|---|---|---|---|---|---|---|---|
| 1KCX | 4.56 | 4.0 | 87.5 | 10000+ | 4.5 | 98.0 | 83 |
| 1KCZ | 4.12 | 3.5 | 85.0 | 1870 | 4.0 | 97.0 | 37 |
| 2KSY | 5.59 | 4.7 | 84.0 | 4640 | 3.65 | 65.2 | 10000+ |
| 2KSX | 5.69 | 4.7 | 82.5 | 525 | 3.65 | 64.0 | 10000+ |
| 2KSZ | 4.29 | 3.65 | 85.0 | 2090 | | | |
| 3KCX | 4.52 | 3.83 | 85.0 | 7952 | | | |
| 3KCZ | 3.80 | 3.27 | 86.0 | 384 | | | |
| 4JSX | 4.16 | 3.5 | 84.2 | 2860 | | | |
| 4JSZ | 4.06 | 3.5 | 86.2 | 9350 | | | |
| 7KSY | 3.00 | 2.6 | 86.7 | 4909 | | | |
| 7KSX | 3.16 | 2.6 | 82.5 | 5188 | | | |
| 7KSZ | 2.65 | 2.25 | 85.0 | 4458 | | | |

failed at fingerlines as far away as one inch from the center of the beam. Likewise, the B-flute boards, Series 7, usually failed on fingerlines which were two inches apart in these boards.

The results of the flexing test indicate that the fatigue resistance of corrugated fiberboard is closely related to ultimate strength. The separate test pieces gave widely varying results and it is considered that flexing tests magnify the effects of poor fabrication.

## Conclusions

The data presented in this paper indicate that the intrinsic physical properties of a corrugated fiberboard may be used in evaluation of the board, that none of the combinations of paperboards tested showed definite superiority over the other combinations in all test procedures, and that the adhesives used in the manufacture of corrugated boards greatly influence the physical properties of the boards. The results of flexing tests on corrugated boards are reported. In most all cases, the fiberboards made with silicate or silicate-clay adhesives gave better test results than comparable boards made with starch adhesives.

## Acknowledgments

The assistance of the Technical Committee of the Sodium Silicate Manufacturers Institute in providing the corrugated boards in consultation regarding the research and in supporting this research is greatly appreciated.

## Literature Cited

(1) Carlson, *Fibre Containers*, 24 (7): 22 (July, 1939).
(2) McCready and Katz, Engineering Research Bulletin no. 28 University of Michigan, Ann Arbor, (Feb., 1939).
(3) Wells, *Fibre Containers*, 24 (10): 8 (Oct., 1939); 24 (11): 8 (Nov., 1939).

TABLE V.—STIFFNESS FACTOR EI, COMPUTED FOR BEAMS AND COLUMNS 1 INCH WIDE

| | Beams | | | | Columns | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Elastic limit | | Rupture | | Critical load | | | | | | |
| | | | | | Vertical | | | | Horizontal | | |
| Corrugations Concave Side Column Length | Parallel Average | Perpendicular Single | Parallel Average | Perpendicular Single | 4 | 6 | 8 | 12 | 4 | 8 | 12 |
| Board | | | | | | | | | | | |
| 1KCX | 94.5 | 178 | 72.3 | 133 | 62.7 | 91.0 | 154 | 129 | 25.6 | 111 | 164 |
| 1KCZ | 78.3 | 127 | 63.5 | 115 | 54.7 | 88.2 | 127 | 107 | 22.7 | 84.5 | 159 |
| 2KSY | 120 | 152 | 82.0 | 139 | 67.5 | 116 | 167 | 139 | 25.1 | 101 | 191 |
| 2KSX | 120 | 167 | 90.2 | 148 | 65.2 | 118 | 168 | 160 | 23.6 | 99 | 175 |
| 2KSZ | 96.2 | 131 | 77.9 | 116 | 57.1 | 91 | 139 | 129 | 23.3 | 103 | 165 |
| 3KCX | 108.5 | 178 | 90.2 | 157 | 55.0 | 94.0 | 157 | 159 | 26.2 | 107 | 174 |
| 3KCZ | 95.7 | 169 | 85.0 | 150 | 45.0 | 61.3 | 105 | 111 | 26.6 | 120 | 195 |
| 4JSX | 80.8 | 229 | 49.7 | 196 | 69.7 | 122 | 156 | 139 | 29.6 | 126 | 234 |
| 4JSZ | 61.0 | 198 | 42.3 | 179 | 59.1 | 94.6 | 125 | 107 | 29.8 | 119 | 201 |
| 5KKX | 118 | ... | 82.3 | 125 | 69.7 | ... | ... | ... | 29.6 | ... | ... |
| 5KKY | 115 | ... | 83.0 | 130 | 78.5 | ... | ... | ... | 35.8 | ... | ... |
| 5KKZ | 87 | ... | 67.0 | 108 | 62.0 | .. | ... | ... | 29.6 | ... | ... |
| 6KKX | 140 | ... | 75.7 | 124 | 84.5 | ... | ... | ... | 29.1 | ... | ... |
| 6KKY | 109 | ... | 79.7 | 128 | 90.0 | ... | ... | ... | 34.2 | ... | ... |
| 6KKZ | 87 | ... | 64.2 | 109 | 65.2 | ... | ... | ... | 28.0 | ... | ... |
| 7KSY | 41.9 | 63.5 | 32.0 | 58.0 | 35.6 | 38.7 | 48.2 | 39.0 | 32.4 | 73 | 80.5 |
| 7KSX | 42.5 | 69.2 | 31.4 | 60.3 | 41.3 | 42.2 | 49.3 | 39.8 | 28.1 | 65 | 82.5 |
| 7KSZ | 33.0 | 59.7 | 25.0 | 53.9 | 35.6 | 35.0 | 45.2 | 31.4 | 25.6 | 63.5 | 76.1 |

# Review Of Paper Industry Literature

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## Lignin

**Isolation of Lignin With Benzyl Alcohol.** Leo Friedman and C. Roland McCully. Paper Trade J. 107, No. 26: 28-29 (Dec. 29, 1938).—The method consists essentially in drying sawdust (ground to pass a 100-mesh sieve), extracting successively with 1:2 alcohol-benzene mixture and with water, refluxing 1 hr. with pure benzyl alcohol containing 3 per cent of hydrogen chloride, filtering hot, washing with hot benzyl alcohol, pouring the cooled filtrate in a fine stream in a large volume of rapidly stirred ether, allowing to settle for 1 day to facilitate filtering, decanting, washing repeatedly with ether by decantation, filtering, and drying in vacuum at 50 deg. C. The ether is distilled from the filtrate, the solution is further concentrated by distilling off the benzyl alcohol under reduced pressure, and the residue is poured into ether to obtain a second yield of precipitated lignin which is treated in the same manner as the first portion. The methoxyl content of the lignin thus obtained is slightly lower than that of Willstätter, Hibbert or Phillips lignin. Benzyl alcohol extraction gives a close to theoretical yield of lignin which is much less altered than that obtained by the other methods.—A.P.-C.

**Action of Ethanolamine on Woody Tissue.** L. E. Wise, F. C. Peterson and W. M. Harbow. Ind.Eng. Chem.Anal.Edit. 11: 18-19 (Jan. 15, 1939).—When 1 g. of dry beech sawdust was extracted for 5 hrs. with anhydrous monoethanolamine just below its boiling point, and the residue treated successively (twice) with water, chlorine water, sulphurous acid, 3 per cent sodium sulphite and water, the percentage of dry residue was nearly identical with the percentage of Cross and Bevan cellulose. Similarly, comparable results were obtained with the corresponding celluloses isolated from large-tooth aspen and brake fern. Under the microscope, the effect of boiling ethanolamine on thin sections of 9 common conifers appeared similar to that observed on chlorination or bromination, a finding which reinforces the analytical data and suggests the use of ethanolamine in the determination of cellulose. Visual gradual effects of cold ethanolamine on various softwoods and hardwoods are also recorded.—A.P.-C.

**Low-Cost Molding Material From Agricultural Wastes.** T. R. McElhinney, T. F. Clark and D. F. J. Lynch. Modern Plastics 16, No. 7: 42-44 (March, 1939); B. I. P. C. 9:361.—Results of work done to date indicate that an inexpensive molding material can be manufactured from agricultural wastes, such as bagasse. The molded products have properties varying with the method of preparation. The three methods discussed in this paper are acid hydrolysis, hydrolysis in the presence of aniline, and alkaline hydrolysis in the presence of fulfural. None of the methods has been carried to a stage where the plastics exhibit an entirely satisfactory performance, although each product has properties to recommend its use and is adaptable to many applications. The results of tests on molded specimens prepared from the plastics thus obtained are given, as well as a description of the procedures employed.—C.J.W.

**Wood Lignin Plastics.** E. C. Sherrard. Farm Chemurgic J. 1, No. 2:63-66 (March, 1939); B. I. P. C. 9:362.—The utilization of lignin is calling for attention in two forms, either as sulphite waste liquor as discharged from the pulp mills, or in the form of sawdust or mill waste of which millions of tons are available; much of this supply is wasted or used for fuel or other minor uses. Lignin alone when plasticized forms a rather brittle resin; the addition of fibrous material increases the strength of the molded resin considerably. Sawdust, wood flour, or asbestos are commonly used as fillers. When wood forms the raw material both the resin and filler can be obtained from the same raw material, the proportion of cellulose to lignin being of importance. The manufacture of a plastic base from sawdust can be accomplished by a number of different methods, such as hydrolysis with dilute acids, solution of cellulose by strong acids and plasticizing the resulting impure lignin, partial chlorination of sawdust and plasticizing the partially chlorinated residue, and hydrolysis with water in the presence of aniline or other organic bases. More work has been done by the Forest Products Laboratory on the hydrolysis method than on any other and next to that the aniline process. Both methods are described in detail. Most of the work on plastics was confined to the hardwoods, like maple, oak, and hickory; however, there is evidence that softwoods are equally suitable.—C.J.W.

**Method for the Determination of Lignin.** Iv. D. Popov. Z. Tierernähr. Futtermittelk. 1:245-249 (1938); C. A. 33:3145.—The new method for determining lignin is based on the solubility of cellulose in a solution containing 40 grams zinc chloride, 100 cc. of 37 per cent hydrochloric acid and 5-10 cc. water. Immediate dilution of such a cellulose solution caused separation of cellulose but this did not occur with solutions after standing for 4-5 hours. Tests showed that the lignin was completely isolated after 10 hours in contact with the solvent. Results agreed with those from tests in which lignin was isolated with 41 per cent hydrochloric acid but were considerably higher than those obtained with 72 per cent sulphuric acid.—C.J.W.

**Mode of Linkage of Formaldehyde in Lignin.** Karl Freudenberg, Fritz Klinck, Erich Flickinger and Alfred Sobek. Ber. 72, No. 2:217-226 (Feb. 8, 1939); B. I. P. C. 9:297.—It is definitely proven that carefully prepared lignin (free of carbohydrates) gives formaldehyde on distillation with 28 per cent sulfuric acid, and that the latter is derived from a methylene oxide group in lignin. This is shown by the reaction of a solution of aniline hydrochloride in aniline on lignin, whereby acridine is formed. Carbohydrates and compounds containing certain groupings do not yield acridine.—C.J.W.

**Sulphuric Acid Esters of the Constituents of Sprucewood.** Karl Freudenberg and Rudolf Keller. Ber. 72, No. 2:331-334 (Feb. 8, 1939); B. I. P. C. 9:297.—On treatment of sprucewood with pyridine-sulphur trioxide, a mixture of compounds is obtained in which each polysaccharide unit contains approximately three, and each lignin unit one $SO_3 \cdot C_5H_5N$ group. This mixture can be separated into three fractions, one consisting of salts of polysaccharide sulphuric acid esters free from methoxyl, one consisting of lignin sulphuric acid esters free from carbohydrates, and a middle fraction containing polysaccharide- and lignin-sulphuric acid ester salts.—C.J.W.

**Action of Nitric Acid on Woods. A Contribution to Lignin Chemistry.** Richard S. Hilpert, Werner Krüger, and Georg Hechler. Ber. 72, No. 5:1075-1082 (May 5, 1939); B. I. P. C. 9:451.—Red beechwood, sprucewood and, for comparison, cotton and sulphite pulp, are treated with concentrated nitric acid or a mixture of nitric and sulphuric acids and the residual products, as well as the portion dissolved in the acid, are analyzed. It is found that the nitrogen content in all residues is almost the same, and to a great extent it is combined as nitrate. A part of it is split off with alkali as ammonia, or with acid as hydrogen cyanide. Methylated beechwood is completely soluble in concentrated nitric acid and is reprecipitated from this solution with water. It has a much lower nitrogen content than the unmethylated beechwood treated in the same way. Some of the methoxyl groups are split off. Sugar lignin and methylated sugar lignin are nitrated to a nitrogen content of 5 to 5.5 per cent of which 0.8 per cent can be split off as ammonia and 0.3 per cent as hydrogen cyanide. From the results of these experiments it is shown that there is no indication of the presence of aromatic nitro compounds in the reaction products. This is in agreement with Hilpert's former conception that there is no aromatic compound present in wood.—C.J.W.

**The Chlorine-Sodium Sulphite Color Reaction of Woody Tissues. II. The Bearing of the Color Reaction on the Constitution of Hardwood Lignin.** Wm. G. Campbell, John C. McGowan and Stephen A. Bryant. Biochem. J. 32: 2138-2141 (1938).—This color reaction was also given by compounds in which the 1, 2, 3-trihydroxybenzene nucleus was modified by certain substituents. If at least one hydroxyl group of a pyrogallol derivative is free, the color reaction is given by oxidizing agents other than chlorine in conjunction with weak alkalies other than sodium sulphite. If all three hydroxyl groups are methylated, chlorination is a necessary antecedent to the production of the color with sodium sulphite. The major product of the chlorination of trimethylgallic acid is a crystalline derivative which does not give a color. The color reaction is given by a secondary product which is phenolic.—A.P.-C.

**Effect of Various Pre-Extractions on the Lignin Determination of Wood.** Elwain E. Harris and R. L. Mitchell. Ind. Eng. Chem. Anal. Ed. 11: 153-155 (March, 1939).—Lignin is shown to be soluble in dilute acid solutions. It may be precipitated by long heating, heating under pressure or increasing the acid concentration. Extraction of lignin-containing material with 3% acid, sodium sulphite, and other salts or bases removes lignin and should be avoided if an accurate determination of the lignin content of wood is desired.—A.P.-C.

## Raw Materials

**Use For Paper Making of Woods of French Tropical Africa.** Pierre Goldsmid. Papeterie 60: 490-501, 550-560, 590-598, 650-659, 690-697, 750-757, 797-803, 853-859, 897-905, 942-949, 997-1002, 1050-1057, 1101-1106, 1153-1158 (June 10 to Dec. 25, 1938).—The following 8 woods were studied and compared with poplar and chestnut: Odiénejé *(Odendyea gabonensis)* from Gabon, Ossongo *(Anthostema aubryanum)* from Gabon, Evino *(Vitex pachyphylla)* from Gabon, Bahia *(Mitragune macrophylla)* from Gabon, Avodiré *(Turraenthus africanus* or *Bingeria africana)* from Ivory Coast, Emien *(Alstonia congensis)* from Ivory Coast, Samba *(Triplochiton scleroxylon)* from Ivory Coast, and Aielé *(Canarium occidentale)* from Ivory Coast. The investigation comprised physico-chemical analysis of the wood, study of the delignification of the wood by the soda process, and production of paper pulp and study of its chemical, physical and micrographical characteristics. *Conclusions.* Cooking of wood can be considered as taking place in two main stages, at first a rapid bimolecular reaction, followed by delignification proper which is monomolecular. A study of the range of commercial cooking (delignification proper) showed that: (1) The influence of temperature on pulp yield follows a practically straight line, the angle of which varies according to the nature of the wood and the time of cooking; for a given wood, the angle decreases with increase in time. (2) The influence of the time of cooking follows a practically straight line, the angle of which varies according to the nature of the wood and the temperature of cooking; for a given wood the angle decreases with rise in cooking temperature. (3) There is a constant relationship between the pulp yield (degree of delignification) and the caustic soda consumption; for a given wood, equal soda consumptions correspond to equal yields, irrespective of the cooking cycle. (4) The effect of temperature and time of cooking on soda consumption is similar to that on yield. (5) The pulp yield is a practically straight-line function of soda consumption, the angle of which varies with the nature of the wood and especially with its hemicellulose content; the soda consumption increases with the hemicellulose content. A study of the relationship between yield (and consequently soda consumption) and ease of bleaching, by means of the permanganate number, showed that: (1) the curve of the permanganate number as a function of soda consumption falls rapidly at the beginning of delignification and tends to become constant towards the end. (2) For a given wood, the permanganate number is the same for a given soda consumption (or pulp yield), irrespective of the cooking cycle. (3) Unbleached pulp can be considered as commercially unbleachable if the yield is greater than 40% on the oven-dry wood, because the bleaching then becomes a delignification by chlorination. With all 8 woods production of commercially bleachable pulps requires a consumption of 21 to 22% of soda, and (as the tropical forest is very heterogeneous) it would be practical to pulp a mixture of the woods. Bleaching must be carried out in two stages, the unbleached pulp being strongly colored by the

products of reaction resulting from decomposition of the incrustants. The relatively high chlorine consumption (7 to 8 per cent on the oven dry pulp) is not considered prohibitive. The yield of bleached pulp is 38% on the oven-dry barked wood, as compared with 40% for poplar. The physical, chemical and micrographic characteristics of the bleached pulps show that they are equal to those of poplar pulp and definitely superior to those of chestnut pulp, and can therefore be used in the manufacture of fine printing papers, blotting, etc. The unbleached pulps are sufficiently strong to be used (with addition of a small proportion of unbleached sulphite) in the manufacture of wrapping paper. A 50% yield of unbleached pulp can be obtained with an 18% soda consumption. Bibliography of 83 references.—A.P.-C.

**Manchurian Woods for Manufacture of Pulp. III.** I. Miura. J. Cellulose Insti. Tokyo 15: 4-6 (1939).—Pulps from Manchurian woods, the cooking properties of which had previously been studied, were subjected to a two-stage bleaching process and the yield and properties of the resultant pulps determined. Of the woods examined, *Picea obovata,* Ladeb., and *Abies nepherolepis,* Max., are considered to be suitable raw materials for paper and rayon. They yield 41.4 per cent and 37.5 per cent, (or 153 and 139 kilos per cu. m. of wood) of bleached pulp, having 89.5 per cent and 91.8 per cent of α-cellulose, respectively. *Pinus koraiensis,* S and Z., and the hardwoods (two sorts of aspen, lime, and birch) give bleached pulps which are inferior to *Picea* and *Abies,* although (except for *Pinus*) their yields per cu. m. of wood are greater than that of *Picea* and *Abies.* The aspens are easily digested by the sulphite process and give readily-bleachable pulps. Maximum yield cu. m. of wood was obtained with *Betula mandshurica,* Nakai (41.4 per cent or 208 kilos per cu. m. of wood), which has the highest volume-weight, but the pulp from this wood has only 79.2 per cent of cellulose α-cellulose.—A.P.-C.

**Paper From Flax and Hemp.** Harry H. Straus. Farm Chemurgic J. 1, no. 1:32-36 (Sept., 1937); B. I. P. C. 9:372.—Reference is made to fine quality light weight papers, such as cigarette papers, condenser tissues, carbon paper, bible paper, etc., which can be made from the virgin fibers of hemp and flax. Apart from the agricultural aspects of the situation, a suitable mechanical decortication method for separating the woody portion of the stalk from the fiber and a chemical method for converting the virgin paper fiber into usable pulp for fine papers had to be evolved. The first stages of development have successfully been passed and the feasibility of the utilization of virgin fiber has been demonstrated. The work so far has been carried out by the Champagne Paper Corporation.—C.J.W.

**Tropical Woods for the Manufacture of Pulp. III. Cooking Experiment With Some Philippine Woods.** I. Miura. J. Cellulose Inst. Tokyo 14: 453-458 (1938).—A number of different species of Philippine woods were digested by the sulphite process and the yield and quality to each case determined before and after bleaching. The yield of unbleached pulp varied from 38 per cent (Molave) to 57.8 per cent (Red lauan), and the majority of the species was not easily digested. The average fiber length varied from a maximum of 1.48 mm. (Apitong) to a minimum of 1.13 mm. (Molave), and the average fiber diameter from a maximum of 0.030 mm. (Apitong) to a minimum of 0.017 mm. (Guijo and Yacal). The losses during bleaching varied considerably, resulting in yields ranging from 32.2 per cent (Molave) to 52.6 per cent (Almon). The alpha-cellulose contents of the pulps were fairly high (maximum 93.1 per cent with Amugis) and it is considered that they are mostly superior in quality to commercial rayon pulps. Owing to difficulties in pulping and their shortness of fiber, however, the woods examined are not considered suitable for paper pulp, and only Almon, Guijo and Amugis are thought to be suitable pulpwoods for rayon.—A.P.-C.

**Sources of Cellulose for Rayon Yarn Manufacture.** Rayon Textile Monthly 20, no. 1:21-23; no. 2:79-80; no. 3:138-139 (Jan.-March, 1939); B. I. P. C. 9:365.—The two most important sources of cellulose for rayon manufacture at present are wood pulp and cotton linters; other sources are hull fiber, bagasse, lint cotton, and the whole cotton plant. It is chemically and physically possible to obtain cellulose suitable for commercial use from almost any kind of vegetable matter; the mere existence in large quantities, however, does not insure its suitability from an economic standpoint. Statistical information on the rayon industry is included.—C.J.W.

**Pulp Woods of Manchoukuo. IV. Analyses and Cooking Experiments of Hard Woods.** M. Shikata and T. Tatsuno. J. Agr. Chem. Soc. Japan 14: 942-950 (1938).— Data are given for the amounts of ash, alpha-, beta- and gamma-celluloses, pentosans, lignin, and substances soluble in water, 1 per cent sodium hydroxide and alcohol-benzene mixture in the hard woods *Fraxinus mandshurica* Rupr., and *Fraxinus rhynchophylla* Hance. The fibers in these are shorter than those of soft woods. Data are also given for the viscosity, copper and Roe numbers, and for the amounts of ash, alpha-, beta- and gamma-celluloses and pentosans in bleached pulps made from these woods by the calcium sulphite and the soda processes, and also for the bleached pulps obtained by the action of chlorine gas followed by treatment with sodium hydroxide and bleaching powder. With both methods, the alpha-cellulose content varies from 88.2 per cent to 92.4 per cent, and 195 to 243 kilos of bleached pulp are obtained per cubic meter of wood. In general, the sulphite pulp contains less ash, pentosan and alpha-cellulose than the soda pulp.—A.P.-C.

**Storage of Pulpwood.** H. Postl. Pappen- u. Holzstoff-Ztg. 46, no. 15:180 (April 14, 1939); B. I. P. C. 9:480.—A method of storing pulpwood is described and illustrated in a sketch employing low concrete supports between which the logs are piled in such a manner that they do not touch the ground, that rain and snow can drain readily, and that good ventilation is provided.—C.J.W.

**German Wood Consumption and Supplying Same With Special Reference to the Tropical Forests.** Ernst Polchau. Wochbl. Papierfabr. 69, no. 49: 1011-16; no. 52: 1123-26 (Dec. 3, 24, 1938).—Germany's need of the raw material "wood" and the possibility of supplying such in the former colonies of West Africa, the great importance of forests to a country, especially to the general eco-

nomic welfare, the consumption of wood for paper has increased over 40 per cent since 1926 and countries which formerly exported wood to Germany are now building mills themselves and forbidding the export of wood, Germany's future supply of wood will come from the tropical forests of her former colonies, the tropical forests of the world are discussed with special emphasis on Kamerun. The various kinds of trees growing in the former colonies, the existing saw mills and other wood industries, and the properties of the wood are discussed, and in conclusion Germany's requirement on colonies, since their share of the world's forest area is only 0.4 per cent, very much smaller than other important countries of the world.—J.F.O.

**Cooking Tests to Determine the Yield of Wood in the Manufacture of Sulphite and Sulphate Pulps.** Th. Wegelius. Finnish Paper and Timber J. 21, no. 7A:92, 94, 96-98, 100-101 (April 14-15, 1939); B. I. P. C. 9:480.—A series of investigations on a laboratory scale was made for studying the effect of wood quality on the yield of sulphite and sulphate pulp. Finnish spruce and pine from various districts with varying density, specific gravity, and width of the annual rings were used. Chips from knot wood were also cooked to study their effect on pulp yield. The results are given in tables and graphs. They indicate that the quality of wood, with the exception of the presence of knots, does not influence the qualitative result to a great extent. Knots lower the yield. The quantitative yield of pulp from tree trunks free from knots and not damaged by decay is rather constant when calculated on the basis of the weight of absolutely dry wood. Appreciable variations are obtained, however, when the yield is calculated on the basis of the volumetric weight, depending on density of the wood, and the diameter and shape of the logs.—C.J.W.

**Progress in Hardwood Pulping for Viscose Rayon,** Charles Carpenter and Frank McCall, Rayon Textile Monthly 19: 538-539, 618-620 (1938).—Experimental pulping and processing data are given for the following Southern hardwoods: black gum *(Nyssa sylvatica),* tupelo *(Nyssa aquatica)* sweet gum (*Liquidambar styraciflua*) and cottonwood *(Populus deltoides virginiana).* The principal pulping hardwoods of the Southeastern States cooked by the sulphite process yield 40 to 43 per cent. The pulps are bleached in 2 and 3 stages with 1 to 2 per cent total chlorine. Each bleached pulp is converted into viscose and spun. These pulps are compared with commercial pulps processed under similar conditions. The hardwood pulps possess the advantages of easy shredding and rapid aging. There are certain limitations in the behavior of the soda celluloses during shredding, in the clarity of the viscose solutions and in the color of yarns.—A.P.-C.

**Spring and Summerwood in Pine and Spruce and Their Influence on the Properties of Sulphite and Sulphate Pulps.** David Johansson. Finnish Paper and Timber J. 21, no. 7A:54, 56-58, 60-62, 64-66, 68-70, 72 (April 14-15, 1939); B. I. P. C. 9:479.—The formation of summerwood was studied on sections of growing annual rings. Some of the latest springwood cells seem to be converted into summerwood through thickening of the cell walls. The density of the two wood kinds was determined in samples of rapidly growing Swedish spruce and pine, as well as of shortleaf pine. The number of cells per square mm. was determined and the thickness of the cell walls calculated. The variations of the density and structure of the wood from center to bark were studied in the sample of shortleaf pine. The relationship between summerwood percentage, density, and width of annual rings in different sections of Swedish spruce and pine were studied in many samples from the roots, middle or top of the trees. Sulphite and sulphate cooks were made with chips prepared from either spring or summerwood exclusively of Swedish spruce and shortleaf pine. The pulp obtained from the summerwood had a much higher tear, but lower tensile strength and burst than the springwood; the latter yield a closer paper formation. Sorting of wood into root and top sections provides the possibility of obtaining pulps with certain desired properties; root wood has a higher tear, but lower tensile strength and burst than top wood, which may be ascribed to variations in the summerwood content. Great differences in the width of the annual rings also result in distinct properties of the sulphite and sulphate pulps. A table is included giving the average width of the annual rings of spruce and pine from different Swedish districts. Pine samples were taken from thinned plots; in spite of the increased width of the annual rings obtained after thinning, the density and summerwood percentage of the newly formed wood were, on the whole, the same as before thinning. The quality of sulphate pulps produced from pine before and after thinning was approximately the same. Photomicrographs, tables, and diagrams are included in the article.—C.J.W.

**Chemistry of Coir Fiber. III. Pulping.** S. R. K. Menon. J. Text. Inst. 29: T285-296 (1938).—Small-scale cooks were made, generally at 170 deg. C., with various amounts of sodium hydroxide and (or) sodium sulphide. In the most drastic treatment the pulp yield was only 40 per cent, but this still afforded 10.7 per cent of furfuraldehyde. When the residue was less than 60 per cent it was suitable for mechanical pulping, and yielded good brown paper; when it was less than 47 per cent it could be bleached and yield good white paper.—A.P.-C.

**Suitability of Beech Wood for Chemical Treatment.** Julia Bartkiewicz. Przemysl Chem. 22:262-266 (1938); C. A. 33:3584.—Neither the damages produced by strong and long-continued frost nor the reaction of the wood organism to the influence of fungi causes any essential changes in the chemical composition of beech wood. Normal beech wood and wood damaged by frost or fungi also show no differences during their chemical treatment (manufacture of pyroligneous acid and cellulose).—C.J.W.

**Wood Pulp. IX. Composition of Beech Wood.** C. K. Pal. J. Cellulose Inst. Tokyo 14: 316-318 (1938).—Japanese beech contains 10.25 per cent moisture, 0.37 per cent ash, 1.83 per cent alcohol-benzene extract, 0.43 per cent alcohol-soluble, 24.58 per cent pentosans and 0.17 per cent galactan; mannan is absent. The lignin and cellulose contents, on the dry and fat-free basis, are 24.95 per cent and 56.64 per cent, respectively.—A.P.-C.

# Imports of Paper and Paper Making Stock

## Giving Manifests of New York, Boston, Philadelphia and Other Ports of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

### NEW YORK IMPORTS

WEEK ENDING FEBRUARY 24, 1940

SUMMARY

Cigarette paper .....209 cs.
Wall board .....4,420 bdls.
Newsprint .....1,966 rolls, 46 bls.
Printing paper .....129 bls., 52 cs.
Wrapping paper .....2,952 rolls, 1,642 bls., 3 cs.
Painting paper .....40 bls.
Painted paper .....4 cs.
Drawing paper .....7 cs.
Filter pulp .....25 bls.
Colored paper .....12 cs.
Basic paper .....20 cs.
Surface coated paper .....23 cs.
Stencil paper .....1 cs.
Miscellaneous paper .....736 rolls, 98 bls., 17 cs.

CIGARETTE PAPER

Braunstein Freres, Inc., ——, Havre, 39 cs.
Dumont Shipping Co., ——, Havre, 22 cs.
H. S. Head, ——, Havre, 148 cs.

WALL BOARD

Treetex Corp., ——, Gothenburg, 3,169 bdls.
Treetex Corp., ——, Gothenburg, 1,251 bdls.

NEWSPRINT

Jay Maaden Corp., *Carolina Thorden,* Finland, 46 bls., 1,536 rolls.
H. Reeve Angel & Co., Inc., *Carolina Thorden,* Finland, 430 rolls.

PRINTING PAPER

American Express Co., *Emile Francqui,* Antwerp, 51 cs.
Rohner Gehrig & Co., *Emile Francqui,* Antwerp, 1 cs.
——, *Aun,* Rotterdam, 62 bls.
W. R. Grace & Co., *Volendam,* Rotterdam, 67 bls.

WRAPPING PAPER

Gilson Bros., *Carolina Thorden,* Finland, 567 rolls.
Brooklyn Standard Bag Corp., *Carolina Thorden,* Finland, 1,642 bls., 2,385 rolls.
Fred. C. Strype, Inc., *Emile Francqui,* Antwerp, 3 cs.

PAINTING PAPER

Lansen Naeve Corp., ——, Havre, 34 bls.
Rohner Gehrig & Co., ——, Havre, 6 bls.

PAINTED PAPER

Pitt & Scott, Ltd., ——, Havre, 4 cs.

DRAWING PAPER

Lansen Naeve Corp., ——, Havre, 7 cs.

FILTER PULP

A. Gusmer, *Christiansborg,* Antwerp, 25 bls.

COLORED PAPER

J W. Hampton, Jr., & Co., *Christiansborg,* Antwerp, 12 cs.

BASIC PAPER

R. Wilson Paper Corp., *Breedyk,* Antwerp, 20 cs.

SURFACE COATED PAPER

W. I. Chudleigh, *Breedyk,* Antwerp, 23 cs.

STENCIL PAPER

Lansen Naeve Corp., *Emile Francqui,* Antwerp, 1 cs.

MISCELLANEOUS PAPER

The Borregaard Co., Inc., ——, Gothenburg, 66 bls, 604 rolls.
F. L. Kramer & Co., ——, Gothenburg, 26 rolls.
T. Matchett, ——, Gothenburg, 32 bls.
Victory Shipping Co., ——, Havre, 2 cs.
Dumont Shipping Co., ——, Havre, 2 cs.
Keller Dorian Paper Co., ——, Havre, 13 cs.
The Borregaard Co., Inc., ——, Gothenburg, 106 rolls.

RAGS, BAGGINGS, ETC.

D. M. Hicks, Inc., *Christiansborg,* Antwerp, 439 bls. flax waste.
Wedeman & Godknecht, *Explorer,* Constanza, 703 bls. rags.
W. Steck & Co., *Exeter,* Alexandria, 106 bls. old rags, 228 bls. old bagging.
D. Benedetto, Inc., *Exeter,* Alexandria, 96 bls. old bagging.
E. J. Keller Co., Inc., *Exeter,* ——, 170 bls. old colored cotton rags, 167 bls. old black cotton rags.
——, ——, Liverpool, 61 bls. rags, 115 bls. cotton waste, 363 bls. old bagging, 69 bls. scrap string.
J. A. Medina, *Siboney,* Vera Cruz, 300 bls. cotton waste.
Continental Bank Trust Co., *Breedyk,* Antwerp, 68 bls. flax waste.
Loumar Textile By-Products Co., *Excello,* Alexandria, 75 bls. old bagging waste.
Castle & Overton, Inc., *Excello,* Alexandria, 194 bls. old bagging.
W. Steck & Co., *Excello,* Alexandria, 98 bls. old bagging.
W. Lowenthal, *Mexico,* Havana, 7 bls. rags.
Loumar Textile By-Products Co., *Emile Francqui,* Antwerp, 81 bls. bagging.
Darmstadt Scott & Courtney, *Emile Francqui,* Antwerp, 82 bls. bagging.

OLD ROPE

W. Steck & Co., *Volendam,* Rotterdam, 66 coils.
E. J. Keller Co., Inc., *Volendam,* ——, 45 coils.

CASEIN

American British Chemical Supplies, *Anita,* Montevideo, 390 bags, 20,000 kilos.

WOOD PULP

Gottesman & Co., Inc., *Explorer,* Constanza, 2,000 bls. bleached sulphite, 400 tons.
Gottesman & Co., Inc., *Exmoor,* Constanza, 1,000 bls. bleached sulphite, 200 tons.
The Borregaard Co., Inc., *Randsfjord,* Sarpsborg, 2,700 bls. dry unbleached sulphate, 457 tons, 300 bls. dry bleached sulphite, 50 tons.
J. Andersen & Co., *Randsfjord,* Sarpsborg, 300 bls. dry bleached sulphite, 50 tons.
Pulp Sales Corp., *Carolina Thorden,* Finland, 1,176 bls. prime strong cellulose, 233 tons.
Pagel Horton & Co., Inc., *Stegeholm,* Sweden, 2,170 bls. wood pulp.
Perkins Goodwin & Co., ——, Gothenburg, 1,688 bls. sulphite.
Castle & Overton, Inc., ——, Gothenburg, 450 bls. dry chemical pulp.
Cellulose Sales Co., Inc., *Consul Corfitzon,* Helsingborg, 8,625 bls. dry sulphite, 1,725 tons; 1,524 bls. air dry sulphite, 305 tons.
Perkins Goodwin & Co., *Consul Corfitzon,* Helsingborg, 8,375 bls. air dry sulphate, 1,675 tons.
Bulkley Dunton Pulp Co., Inc., *Consul Corfitzon,* Helsinborg, 500 bls. air dry sulphite, 100 tons.
Pagel Horton & Co., Inc., *Goonawara,* Sweden, 500 bls. sulphite.
Price & Pierce, Ltd., *Inger,* ——, 4,500 bls. unbleached sulphite, 7,800 bls. unbleached sulphate.
Cellulose Sales Co., Inc., ——, Gothenburg, 1,070 bls. sulphate, 2,207 bls. wood pulp.
Bulkley Dunton Pulp Co., Inc., ——, Gothenburg, 500 bls. wood pulp.
Perkins Goodwin & Co., ——, Gothenburg, 462 bls. dry sulphate.
Pagel Horton & Co., Inc., *Blankaholm,* Sweden, 685 bls. dry sulphate, 845 bls. sulphite.

WOOD PULP BOARD

H. Fuchs & Son, ———, Gothenburg, 6 crates.

## PORTLAND IMPORTS

WEEK ENDING FEBRUARY 24, 1940

Price & Pierce, Ltd., *Tunaholm,* ———, 2,838 bls. bleached sulphate.

## BOSTON IMPORTS

WEEK ENDING FEBRUARY 24, 1940

W. A. Kember, *Exeter,* Alexandria, 48 bls. rags.
Chase National Bank, *Breedyk,* Antwerp, 189 bags casein.
H. W. Hobbs, *Breedyk,* Antwerp, 339 rolls wrapping paper.
W. A. Kember, *Breedyk,* Antwerp, 5 bls. paper.
Price & Pierce, Ltd., *Orion,* ———, 10,500 bls. unbleached sulphite, 1,230 bls. unbleached sulphate.

## PHILADELPHIA IMPORTS

WEEK ENDING FEBRUARY 24, 1940

Gottesman & Co., Inc., *Explorer,* Constanza, 200 bls. bleached sulphite, 40 tons.
Castle & Overton, Inc., *Extavia,* Piraeus, 707 bls. old dark dark cotton rags.
E. J. Keller Co., Inc., *Extavia,* ———, 390 bls. old cotton rags.
Pagel Horton & Co., Inc., *Stegeholm,* Sweden, 750 bls. wood pulp.
E. J. Keller Co., Inc., *Excello,* ———, 306 bls. colored cotton rags, 79 bls. white cotton rags, 33 bls. black cotton rags.

## WILMINGTON IMPORTS

WEEK ENDING FEBRUARY 24, 1940

Price & Pierce, Ltd., *Herma Gorthon,* ———, 17,370 bls. unbleached sulphite.
Price & Pierce, Ltd., *O. Petersen,* ———, 25,500 bls. unbleached sulphite.

## BALTIMORE IMPORTS

WEEK ENDING FEBRUARY 24, 1940

Nolan Bowmall & Co., Inc., *Explorer,* Constanza, 1,725 bls. unbleached sulphite.
P. H. Glatfelter, *Explorer,* Constanza, 1,000 bls. unbleached sulphite.
H. Reeve Angel & Co., Inc., *Carolina Thorden,* Finland, 1,474 rolls newsprint.
Jay Madden Corp., *Carolina Thorden,* Finland, 718 rolls newsprint.
Pulp Sales Corp., *Carolina Thorden,* Finland, 304 bls. prime strong sulphite.
Pagel Horton & Co., Inc., *Stegeholm,* Sweden, 2,670 bls. wood pulp.
Pagel Horton & Co., Inc., *Goonawara,* Sweden, 5,000 bls. wood pulp.

## NORFOLK IMPORTS

WEEK ENDING FEBRUARY 24, 1940

———, *Breedyk,* Antwerp, 191 bls. flax waste.

## LOS ANGELES IMPORTS

WEEK ENDING FEBRUARY 24, 1940

———, *Kingsley,* Powell River, 1,678 pkgs. news print, 115 pkgs. paper stock.
———, *Grenanger,* Buenos Ayres, 25 tons paper stock.
———, *Josephine Lawrence,* Ocean Falls, 255 rolls newsprint.
———, *Besholt,* Shanghai, 347 tons rags.
———, *Pres. Coolidge,* Osaka, 1 cs. paper hangings, 4 cs. tissue paper.
———, *Axel Johnson,* Falun, 271 pkgs. newsprint.
———, *Axel Johnson,* Norrkoping, 407 pkgs. newsprint.
———, *Knute Nelson,* Oslo, 108 rolls newsprint.
———, *Axel Johnson,* Gothenburg, 49 rolls wrapping paper, 900 bls. sulphate pulp.
———, *Geisha, Gothenburg,* 10,050 bls. unbleached sulphate, 1,680 tons; 1,500 bls. dry pulp, 250 tons; 3,000 bls. unbleached sulphite, 501 tons; 1,320 bls. wood pulp screenings, 220 tons; 1,750 tons unbleached sulphite.
———, *Rosebank,* Powell River, 686 pkgs. newsprint.

## Goes With Reynolds Metal Co.

T. M. Hill, well known in the paper trade for the past twelve years, has joined the Reynolds Metals Company, of Richmond, Va., and is handling that company's sales to the paper industry. With recent improvements in fast color printing on metal, the Reynolds Metals Company has felt that its sales of 'unifoil' for commercial printing should be handled through paper wholesalers and has now obtained the services of Mr. Hill as a man particularly acquainted with the needs of the paper industry. Mr. Hill will work hand in hand with national wholesalers in the merchandising of 'unifoil' and through advertising and direct mail will help them move the metal line rapidly.

'Unifoil' is an expressly processed light gauge metal that is easily and economically adaptable to multi-colored and ordinary printing of all types for commercial purposes. Common uses of 'unifoil' printing appear on the daily market on beer and bottle labels, tight wrapped packages, box cartons, bags, envelopes, displays of all kinds, Christmas and greeting cards, and etc. Due to its eye-appeal and durability, the use of 'unifoil' is rapidly increasing on new products throughout the country and abroad.

Mr. Hill has been identified with the Ablemarle Paper Company of Richmond, Va., for the past twelve years and since 1932 has been advertising and sales promotion manager of that company. He is 37 years old and spent two years in the banking business after leaving the University of Richmond in 1926.

## Hold Contest on Carico Tympan

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., February 26, 1940—A sales contest on Topsheet Treated Tympan, beginning March 1 and ending April 30, was announced at a sales meeting of Carter, Rice & Co., Corp., held Saturday morning. Very suitable and attractive prizes are to be awarded to the winners. The first prize is a handsome Zenith Portable Radio; the second, a General Electric Ship's Model Electric Clock, equipped with a ship's bell, and the third, a man's travelling bag. The entire sales organization is extremely enthusiastic about the contest, which, no doubt, will be reflected in its success. Carico Topsheet Tympan is reputed to be one of the finest grades of high quality Tympan.

## Chicago Paper Co. Holds Sale Conference

CHICAGO, Ill., February 26, 1940—The 25th annual sales conference of the Chicago Paper Company's 100 per cent Club was held during the final days of January in conjunction with the 58th anniversary of the well known Chicago jobbing house. A speaking program was arranged with W. N. Gillett, president; C. R. Braatsch, treasurer and other executives appearing before a group of 50 members and guests. Guest speakers included H. H. Brunnings and E. B. Bowman. W. A. Stockbarger, sales representative in Indiana and Michigan, was elected president of the club with H. L. Pohlmann, Illinois representative, as treasurer.

# New York Paper and Pulp Market Review

## Wholesale Sales Volume In Many Grades of Paper Currently Running At About 5 Per Cent Higher Than In Like Period Last Year — Demand For Chemical Pulp More Active—Domestic and Canadian Kraft Higher.

Office of the PAPER TRADE JOURNAL,
Wednesday, February 28, 1940.

Sales of paper, paper board and paper products are currently running about 5 per cent above the corresponding week last year, according to the reports received from many leading manufacturers' representatives, jobbers, and general paper merchants during the week. The business prospect is generally viewed as good.

The index of general business activity declined to 96.6 per cent for the week ended February 17, compared with 98.6 per cent for the precedent week, and with 89.1 per cent for the corresponding week last year.

Paper production of 167 mills for the week ended February 17 was estimated at 84.5 per cent. This compares with 80.6 per cent in 1939, with 68.4 per cent in 1938, with 90.4 per cent in 1937, and with 78.5 per cent for the corresponding week in 1936.

Paper board production for the week ended February 17 was 70.0 per cent, compared with 67.0 per cent in 1939, with 60.0 per cent in 1938, with 85.0 per cent in 1937, and with 66.0 per cent for the corresponding week in 1936.

No important change in the newsprint market has been reported during the current week. Prices are firm with no changes expected in the trade in the near future. Domestic production continues at a high level and Canada reports business prospects for the year are good.

In view of the decline in production and general trade in many parts of the country this year, consumer demand for many kinds of paper and paper products continues at an encouragingly high level. Despite the uncertainties and fears in circulation, the outlook for business this year continues good. Reports received this week indicate that kraft and paper board are most active.

### Mechanical Pulp

No important change in the market situation of domestic and foreign mechanical pulp has been reported this week. Prices hold firm at prevailing representative market quotations.

### Chemical Pulp

The chemical pulp market is reported in some quarters of the trade as a little more active this week, despite the decline in pulp consumption indicated by the lower production ratio reported by many mills. Prices are firm with no changes in any grade of sulphite pulp. The prices on domestic and Canadian kraft, however, have been revised upward this week, domestic and Canadian kraft pulp now being quoted at from 2.00 to 2.37½.

### Rags

No important change in demand or prices has been reported in any grade of new and old rags this week. Domestic mill buying is a little more active, following the usual quiet period in this market during Paper Week. While the market is reported as rather soft, prices hold in all grades.

### Old Rope and Bagging

Old rope prices are reported as very firm and practically nominal. While the representative prices on domestic No. 1 Manila rope continues unchanged at from 4.25 to 4.50, some sales of No. 1 domestic Manila are reported at 4.75.

Prices have been advanced on foreign gunny this week, which is currently quoted at from 2.75 to 3.00. Domestic No. 1 gunny is also up and is quoted at from 2.50 to 2.75. Wool tares are also higher, the light grade being currently quoted at from 2.00 to 2.25 and heavy wool tares at from 2.12½ to 2.25.

### Old Waste Paper

No change has been reported in any grade of paper stock this week. Although collections are reported off owing to the recent snowfall, less paper board mill activity more or less offsets the accumulation of supplies.

### Twine

No important change has been reported in the twine market this week. The prices on all grades of hard and soft fiber twines continue relatively firm and conform to prevailing representative market quotations.

## The Paper Container Problem

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., February 26, 1940—The paper container problem has reared up again when attorneys for Fieldcrest Dairies filed a brief with the Federal Master in Chancery in support of their suit for an injunction to compel the city of Chicago to allow the dairy to sell milk in paper containers in Chicago. This action is expected to speed up matters which have been dragging along since last spring. The brief calls the city's ban on paper cartons "absurd, ridiculous and discriminatory". The city's objections to the use of paper cartons for retail milk sales, according to the dairy, is without foundation in scientific fact. Their use in 485 cities and towns, including 70 Chicago suburbs, refutes this argument, the dairy contends. Citing the alleged refusal of the city to make any research on the paper container question until forced to do so by the suit, the dairy's brief stated that "no court can view this arbitrary conduct and theory of defense shown except as an exhibition of confirmed prejudice either sired in ignorance or supported by some superficial or selfish reasons which certainly have no reasonable relation whatsoever to the preservation and promotion of public health".

# MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL.
Wednesday, February 28, 1940.

BLANC FIXE—Quotations on blanc fixe are firm under a moderately active demand. Prices conform to prevailing market quotations. The pulp is currently quoted at $35 per ton, in barrels, at works. The powder is quoted at $50 per ton, in bags, at works.

BLEACHING POWDER—Prices on bleaching powder are firm and continue unchanged at prevailing market levels. Bleaching powder is currently quoted at $2 per 100 pounds, in drums, at works.

CASEIN—The demand for casein continues moderately good with prices a little lower. Standard domestic casein, 20-30 mesh, is currently quoted at 12 cents per pound; 80-100 mesh, at 12½ cents per pound; all prices in bags, car lots. Standard Argentina casein is offered at 11 cents per pound. French casein is quoted at 16 cents per pound.

CAUSTIC SODA—Quotations on caustic soda are firm under a moderately active demand. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Prices on china clay are firm and unchanged at prevailing market prices. Domestic filler clay is currently quoted at from $7 to $15 per ton; coating clay at from $11 to $22 per ton, at mines. Imported clay is offered at from $13.50 to $25 per ton, ship side.

CHLORINE—Quotations on chlorine are firm under a moderately active demand. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank car, f.o.b., works.

ROSIN—The rosin market is reported as firm and prices a little higher for the week. "G" gum rosin is currently quoted at $5.45 per 280 pounds, gross weight, in barrels, Savannah. "FF" wood rosin is offered at $5.40 per 280 pounds, gross weight, in barrels, New York. Gum rosin size is quoted at $2.90 per 100 pounds f.o.b., shipping point.

SALT CAKE—Prices on salt cake are firm under a steady volume of domestic shipments and prices are practically nominal. Domestic salt cake is currently quoted at $17 per ton, in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point. The quotation of $20 per ton on imported salt cake continues nominal.

SODA ASH—Quotations on soda ash are firm and unchanged at prevailing market prices. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are a little higher for the week. Globe pearl is currently quoted at $2.60 per 100 pounds; special paper starch at $2.70 per 100 pounds; all prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm with shipments in good volume. The commercial grades are currently quoted at $1.15 per 100 pounds; iron free at $1.45 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Prices on sulphur are unchanged and conform to prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $19 per ton.

TALC—Quotations on talc continue unchanged at prevailing market levels. Domestic talc is currently quoted at from $15 to $18 per ton, Eastern mines. Imported talc is quoted at from $23 to $45 per ton.

# MARKET QUOTATIONS

## Paper

(Delivered New York)

| | | | |
|---|---|---|---|
| News, per ton— | | | |
| Roll, contract | $50.00 | @ | — |
| Sheets | 58.00 | " | — |
| Kraft—per cwt.—Delivered Zone A | | | |
| Northern, Extra Quality | $5.00 | @ | $5.50 |
| Superstandard | 4.62½ | " | 5.00 |
| Northern Standard Wrapping | 4.25 | " | 4.62½ |
| Standard Wrapping | 4.00 | " | — |
| Tissues—Per Ream—Carlots | | | |
| White No. 1 | .92½ | @ | — |
| White No. 1 M. G. | .90 | " | — |
| White No. 1½ | .70 | " | — |
| White No. 2 | .65 | " | — |
| Anti-Tarnish M. G. | .80 | " | — |
| Colored | .87½ | " | — |
| Kraft | .80 | " | — |
| Manila | .65 | " | — |
| Unbl. Toilet, 1 M. | 3.50 | " | — |
| Bleached Toilet | 5.26 | " | — |
| Paper Towels, Per Case— | | | |
| Unbleached, Jr. | 1.95 | @ | — |
| Bleached, Jr. | 3.20 | " | — |
| Manila—per cwt.—C. l. f. a. | | | |
| No. 1 Jute | 8.25 | @ | 10.25 |
| No. 1 Manila Wrapping, 35 lb. | 5.25 | " | — |
| No. 2 Manila Wrapping, 35 lb. | 5.00 | " | — |
| Boards, per ton— | | | |
| News | 45.00 | @ | — |
| Chip | 45.00 | " | — |
| Sgl. Mla. Lt. Chip | 57.50 | " | — |
| Jute Lined Chip | 57.50 | " | — |
| White Pat. Coated | 70.00 | " | — |
| Kraft Liners | 55.00 | " | — |
| Binders Boards | 76.00 | " | 87.00 |

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

| | Bonds | | Ledgers |
|---|---|---|---|
| 100% Rag Ext. No. 1 | $39.10@$46.00 | | $40.25@$47.25 |
| 100% Rag | 31.05 " 36.50 | | 32.20 " 37.75 |
| 85% Rag | .... " .... | | 29.90 " 35.00 |
| 75% Rag | 23.60 " 27.75 | | 24.75 " 29.00 |
| 65% Rag | .... " .... | | 21.65 " 26.25 |
| 50% Rag | 17.55 " 21.50 | | 18.70 " 22.75 |
| 25% Rag | 14.65 " 17.75 | | 15.80 " 19.25 |

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

| | Bonds | Ledgers |
|---|---|---|
| No. 1 | $8.95@$11.00 | $10.10@$12.25 |
| No. 2 | 8.05 " 9.75 | 9.25 " 11.25 |
| No. 3 | 7.60 " 9.25 | 8.50 " 10.75 |
| No. 4 | 7.30 " 9.00 | 8.50 " 10.25 |

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper,

Delivered in Zone 1:

| | | | |
|---|---|---|---|
| No. 1 Glossy Coated | $11.90 | @ | $13.50 |
| No. 2 Glossy Coated | 10.35 | " | 11.75 |
| No. 3 Glossy Coated | 9.55 | " | 11.00 |
| No. 4 Glossy Coated | 9.15 | " | 10.50 |
| No. 1 Antique (watermarked) | 8.35 | " | 9.50 |
| No. 2 Offset | 7.70 | " | 9.00 |
| A Grade E. F. | 7.50 | " | 8.75 |
| A Grade S. & S. C. | 7.75 | " | 9.00 |
| B Grade E. F. | 6.95 | " | 8.00 |
| B Grade S. & S. C. | 7.20 | " | 8.25 |
| C Grade E. F. | 6.65 | " | 7.75 |
| C Grade S. & S. C. | 6.90 | " | 8.00 |
| D Grade E. F. | 6.40 | " | 7.50 |
| D Grade S. & S. C. | 6.65 | " | 7.75 |

Ivory & India at $.50 cwt. extra.

## Mechanical Pulp

(On Dock, Atlantic Ports)

| | | | |
|---|---|---|---|
| No. 1 Imported— | | | |
| Moist | $38.00 | @ | 44.00 |
| Dry | 38.00 | " | 44.00 |
| (Delivered) | | | |
| No. 1 Domestic and Canadian | 40.00 | @ | 42.00 |

## Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

| | | | |
|---|---|---|---|
| Bleached Sulphite (Domestic and Foreign)— | | | |
| Prime Bleached Sulphite | 3.00 | @ | 3.40 |
| Prime Qualities— | | | |
| Easy-Bleaching Sulphite | 2.75 | " | 2.95 |
| Strong Unbleached Sulphite | 2.75 | " | 2.85 |
| (On Dock, Atlantic Ports) | | | |
| Kraft Bleached | 3.00 | @ | 3.50 |
| Kraft Light & Strong | 2.50 | " | 2.75 |
| Kraft No. 1 | 2.40 | " | 2.65 |
| (F. o. b. Pulp Mill) | | | |
| Kraft Domestic and Canadian | 2.00 | " | 2.37½ |
| (Delivered) | | | |
| Soda Bleached | 2.90 | " | — |

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

## Domestic Rags

### New Rags

(Prices to Mill f. o. b. N. Y.)

| | | | |
|---|---|---|---|
| Shirt Cuttings— | | | |
| New White, No. 1 | 7.50 | @ | 7.75 |
| Silesias No. 1 | 4.50 | " | 4.75 |
| New Unbleached | 7.50 | " | 7.75 |
| Blue Overall | 5.00 | " | 5.25 |
| Fancy | 2.25 | " | 2.50 |
| Washables | 2.00 | " | 2.15 |
| Mixed Khaki Cuttings | 2.75 | " | 3.00 |
| O. D. Khaki Cuttings | 3.25 | " | 3.50 |

### Old Rags

| | | | |
|---|---|---|---|
| White, No. 1— | | | |
| Repacked | 3.25 | " | 3.50 |
| Miscellaneous | 2.75 | " | 3.00 |
| White, No. 2— | | | |
| Repacked | 2.50 | " | 2.75 |
| Miscellaneous | 2.00 | " | 2.25 |
| Thirds and Blues— | | | |
| Repacked | 2.00 | " | 2.25 |
| Miscellaneous | 1.75 | " | 1.90 |
| Roofing Rags— | | | |
| No. 1 | 1.50 | " | 1.55 |
| No. 2 | 1.20 | " | 1.27½ |
| No. 3 (bagging) | 1.50 | " | 1.60 |
| No. 4 | .60 | " | .65 |
| No. 5A | .60 | " | .65 |

## Foreign Rags

All prices nominal.

### New Rags

| | | | |
|---|---|---|---|
| New Dark Cuttings | 2.25 | @ | 2.40 |
| New Mixed Cuttings | 2.00 | " | 2.20 |
| New Light Silesias | 5.50 | " | 5.75 |
| Light Flannelettes | 5.50 | " | 5.75 |
| New White Cuttings | 7.00 | " | 7.50 |
| New Light Oxford | 4.00 | " | 4.50 |
| New Light Prints | 3.00 | " | 3.25 |

### Old Rags

| | | | |
|---|---|---|---|
| No. 1 White Linens | 7.50 | " | 8.50 |
| No. 2 White Linens | 6.50 | " | 7.50 |
| No. 3 White Linens | 4.50 | " | — |

WOOD PULP
AGENTS

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**West Virginia Pulp and Paper Company**

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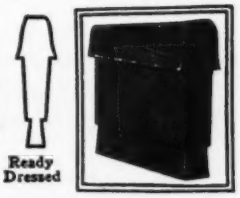

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**SCREENS** of Perforated Metal

The Harrington & King PERFORATING CO.
5652 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N.Y.

| | | | |
|---|---|---|---|
| No. 4 White Linens. | 2.25 | @ | 3.25 |
| No. 1 White Cotton. | 4.25 | " | 4.75 |
| No. 2 White Cotton. | 3.25 | " | 3.75 |
| No. 3 White Cotton. | 2.50 | " | 3.00 |
| No. 4 White Cotton. | 1.90 | " | 2.20 |
| Extra Light Prints.. | 2.00 | " | 2.40 |
| Ord. Light Prints... | 1.75 | " | 2.15 |
| Med. Light Prints... | 1.55 | " | 1.95 |
| Dutch Blue Cottons. | 2.25 | " | 2.50 |
| French Blue Linens.. | 3.00 | " | — |
| Checks and Blues... | 2.00 | " | — |
| Linsey Garments.... | 1.90 | " | 2.00 |
| Dark Cottons..... | 1.50 | " | 1.60 |
| Old Shopperies..... | 1.30 | " | 1.45 |
| New Shopperies..... | 1.45 | " | 1.50 |
| French Blues..... | 2.25 | " | 2.50 |

## Old Rope and Bagging

(Prices to Mill, f. o. b. N. Y.)

| | | | |
|---|---|---|---|
| Gunny No. 1— | | | |
| Foreign ..... | 2.75 | @ | 3.00 |
| Domestic ..... | 2.50 | " | 2.75 |
| Wool Tares, light... | 2.00 | " | 2.25 |
| Wool Tares, heavy.. | 2.12½ | " | 2.25 |
| Bright Bagging..... | 2.25 | " | 2.50 |
| Manila Rope— | | | |
| Foreign ..... | 4.25 | " | 4.50 |
| Domestic ..... | 4.25 | " | 4.50 |
| Jute Threads..... | 3.00 | " | 3.25 |
| Sisal Strings..... | 2.00 | " | 2.25 |
| Mixed Strings..... | .70 | " | .85 |

## Old Waste Papers

(F. o. b. New York)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| White Envelope Cuttings ..... | 3.10 | @ | 3.25 |
| Ordinary Hard White No. 1.... | 2.25 | @ | 2.50 |
| Soft White No. 1.. | 1.80 | " | 1.90 |
| Soft White Extra.. | 2.50 | " | 2.60 |
| Flat Stock— | | | |
| Stitchless ..... | 1.10 | " | 1.25 |
| Overissue Mag.... | 1.00 | " | 1.10 |
| Solid Flat Book... | .80 | " | .90 |
| Crumbled No. 1... | .70 | " | .75 |
| Ledger White Stock. | 1.75 | " | 1.85 |
| Ledger Stock Colored | 1.05 | " | 1.15 |
| Manila— | | | |
| New Env. Cut.... | 1.70 | " | 1.80 |
| New Cuttings..... | 1.30 | " | 1.40 |
| Old Kraft Machine— Compressed bales.. | 1.35 | " | 1.40 |
| News— | | | |
| No. 1 White News | 1.75 | " | 1.90 |
| Strictly Overissue. | .70 | " | .75 |
| Strictly Folded.... | .47½ | " | .52½ |
| Corrugated ..... | .60 | " | .65 |
| No. 1 Mixed Paper.. | .27½ | " | .32½ |

## Twines

(F. o. b. Mill)

(Soft Fiber)

| | | | |
|---|---|---|---|
| Coarse Polished— | | | |
| India ..... | .18½ | @ | — |
| White Hemp..... | .18½ | " | — |
| Fine Polished— | | | |
| Fine India..... | .23 | " | — |
| Unpolished— | | | |
| Box ..... | .14¾ | " | — |
| Paper Makers..... | .15 | " | — |
| Tube Rope..... | .16¼ | " | — |
| Wall Paper..... | .15¾ | " | — |
| Wrapping ..... | .18 | " | — |
| Soft Fiber Rope... | .16¼ | " | — |
| Cotton ..... | .21 | " | — |

(Hard Fiber)

| | | | |
|---|---|---|---|
| Medium Java..... | .19 | " | — |
| Mex. Sisal..... | .16 | " | — |
| Manila ..... | .24 | " | — |
| Domestic ..... | 4.00 | @ | 4.50 |
| Sisal Rope..... | 2.25 | " | 2.65 |
| Mixed Rope..... | .75 | " | 1.00 |
| Transmission Rope.. | 3.00 | " | 3.50 |
| Soft Jute Ropes..... | 3.00 | " | 3.50 |
| Jute Carpet Threads. | 1.50 | " | 1.75 |
| Gunny Bagging— | | | |
| Foreign ..... | 3.00 | @ | — |
| Domestic ..... | 2.45 | " | 2.50 |
| Bleachery Burlap.... | 3.50 | " | 3.75 |
| Scrap Burlap— | | | |
| Foreign ..... | 2.40 | " | 2.50 |
| Domestic ..... | 2.25 | " | 2.40 |
| Scrap Sisal..... | 2.25 | " | 2.50 |
| Scrap Sisal for Shredding ..... | 2.30 | " | 2.65 |
| Wool Tares, Heavy.. | 2.50 | " | 2.60 |
| New Burlap Cuttings | 3.25 | " | 3.50 |
| Aust. Wool Pouches. | 2.90 | " | 3.00 |
| Heavy baling bagging | 2.50 | " | 2.75 |
| Paper Mill Bagging.. | 1.75 | " | 2.00 |
| No. 2 Bagging ..... | 1.10 | " | 1.25 |

## Domestic Rags ( New)

(F. o. b. Boston)

| | | | |
|---|---|---|---|
| Shirt Cuttings— | | | |
| New Light Prints... | .03¼ | @ | .03½ |
| New White No. 1... | .08 | " | .08¼ |
| New Light Flannelettes ..... | .05 | " | — |
| Silesias No. 1 ..... | .05 | " | — |
| New Black Silesias.. | .03½ | " | .03¾ |
| Soft Unbleached.... | 7.50 | " | 8.00 |
| Blue Cheviots ..... | .05½ | " | .06 |
| Fancy ..... | .02 | " | .02½ |
| Washable ..... | .02 | " | .02½ |
| Cottons—According to grades— | | | |
| Blue Overalls .... | .05¼ | " | .05½ |
| New Black, soft .. | .03½ | @ | .04 |
| Khaki Cuttings .... | .02½ | " | .03 |
| O. D. Khaki ..... | .03 | " | .03¼ |
| Corduroy ..... | .02¾ | " | .03 |
| New Canvas..... | .06¾ | " | .07¼ |
| B. V. D. Cuttings... | .07 | " | .07¼ |

## Domestic Rags (Old)

(F. o.b. Boston)

| | | | |
|---|---|---|---|
| Canvas ..... | .04¼ | @ | — |
| White No. 1— | | | |
| Repacked ..... | — | " | 2.75 |
| Miscellaneous ..... | 2.50 | " | 2.75 |
| White No. 2— | | | |
| Repacked ..... | 1.90 | " | 2.00 |
| Miscellaneous .... | 2.00 | " | 2.25 |
| Twos and Blues .... | 2.25 | " | 2.50 |
| Old Blue Overalls .. | 1.60 | " | 2.00 |
| Thirds and Blues— | | | |
| Repacked ..... | 2.00 | " | 2.25 |
| Miscellaneous .... | 1.50 | " | 1.60 |
| Black Stockings .... | 4.00 | " | 4.25 |
| Roofing Stock— | | | |
| No. 1..... | 1.75 | " | 2.00 |
| No. 2..... | 1.60 | " | 1.65 |
| No. 3..... | 1.00 | " | 1.25 |

## Foreign Rags

(F. o. b. Boston)

| | |
|---|---|
| Dark Cottons.....(nominal) | |
| Dutch Blues.....(nominal) | |
| New Checks and Blues(nominal) | |
| Old Fustians.....(nominal) | |
| Old Linsey Garments.(nominal) | |
| New Silesias.....(nominal) | |

# PHILADELPHIA

## Domestic Rags (New)

(Price to Mill, f.o.b. Phila.)

| | | | |
|---|---|---|---|
| Shirt Cuttings— | | | |
| New White No. 1. | .07¼ | @ | .07½ |
| New White No. 2. | .04 | " | .04½ |
| Light Silesias..... | — | " | .04½ |
| Silesias, No. 1.... | — | " | .04½ |
| Black Silesias, soft | — | " | .03¾ |
| New Unbleached.. | .05½ | " | .06 |
| Washable, No. 1.. | — | " | .04 |
| Blue Overall..... | — | " | .05 |
| Cottons—According to grades— | | | |
| Washable No. 2... | — | " | .02 |
| New Blue ..... | — | " | .02 |
| Fancy Percales.... | — | " | .03 |
| New Black Soft... | — | " | .04 |
| New Light Seconds | .04½ | " | .05 |
| New Dark Seconds | — | " | 1.55 |
| Khaki Cuttings— | | | |
| No. 1 O. D..... | .03½ | " | .04 |
| No. 2 Mixed..... | .03 | " | .03¼ |
| Corduroy ..... | — | " | .02½ |
| New Canvas..... | .05½ | " | .06 |
| New Black Mixed. | — | " | .03 |

## Domestic Rags (Old)

| | | | |
|---|---|---|---|
| White No. 1— | | | |
| Repacked ..... | 3.25 | @ | 3.75 |
| Miscellaneous .... | 2.75 | " | 3.00 |
| Thirds and Blues— | | | |
| Miscellaneous .... | 2.00 | " | 2.25 |
| Repacked ..... | 2.50 | " | 2.75 |
| Black Stockings (Export) ..... | 3.50 | " | 4.00 |
| Roofing Stock— | | | |
| Foreign No. 1....Nominal | | | |
| Domestic No. 1.. | 1.50 | " | 1.60 |
| Domestic No. 2... | 1.35 | " | 1.45 |
| Roofing Bagging.. | — | " | 1.30 |

## Bagging

(f.o.b. Phila.)

| | | | |
|---|---|---|---|
| Gunny, No. 1— | | | |
| Foreign .....Nominal | | | |
| Domestic ..... | 2.50 | @ | 3.00 |
| Manila Rope..... | 3.25 | " | 3.75 |
| Sisal Rope..... | 1.75 | " | 2.00 |
| Mixed Rope..... | 1.25 | " | 1.50 |
| Scrap— | | | |
| No. 1..... | 2.25 | " | 2.50 |
| No. 2..... | — | " | 1.30 |
| Wool Tares, heavy.. | 3.50 | " | 3.70 |
| Mixed Strings .... | .75 | " | 1.00 |
| No. 1 New Light Burlap ..... | 3.00 | " | 3.50 |
| New Burlap Cuttings | 2.00 | " | 2.25 |

## Old Papers

(f.o.b. Phila.)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| No. 1 Hard Write | 2.25 | @ | 2.30 |
| No 2 Hard White | 2.00 | " | 2.10 |
| No. 1 Soft White | 1.85 | " | 1.90 |
| No. 2 Soft White | 1.50 | " | 1.60 |
| No. 1 Mixed..... | .90 | " | 1.00 |
| Solid Ledger Stock.. | 1.50 | " | 1.60 |
| Ledger Stock, white. | 1.40 | " | 1.45 |
| Ledger Stock, colored | 1.10 | " | 1.20 |
| No. 1 Books, heavy.. | .90 | " | .95 |
| Manila Cuttings..... | 1.75 | " | 1.80 |
| Print Manila..... | .50 | " | .55 |
| Container Manila.... | .40 | " | .45 |
| Kraft Paper..... | 1.00 | " | 1.10 |
| No. 1 Mixed Paper.. | .30 | " | .35 |
| Straw Board Chip... | — | " | .40 |
| Binders Board Chip.. | .40 | " | — |
| Corrugated Board... | .60 | " | .65 |
| Overissue News..... | .70 | " | .75 |
| Old Newspapers..... | .50 | " | .55 |

# BOSTON

## Old Papers

(f.o.b. Boston)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| No. 1 Hard White | 2.25 | @ | 2.50 |
| No. 1 Soft White | 1.85 | " | 2.15 |
| No. 2 Mixed..... | .75 | " | .80 |
| Solid Ledger Books.. | 1.30 | " | — |
| Overissue Ledger Stock ..... | 1.30 | " | 1.50 |
| Mixed Ledgers..... | .85 | " | .90 |
| No. 1 Books, heavy.. | 1.00 | " | 1.10 |
| No. 1 Books, light.. | .65 | " | .75 |
| Crumpled Stitchless Book Stock..... | .55 | " | .65 |
| Manila Env. Cuttings | 1.70 | " | 1.85 |
| Manila Envelope Cuttings, extra quality | 2.35 | " | 2.60 |
| White Blank News.. | 1.40 | @ | 1.50 |
| No. 1 Kraft..... | 1.10 | " | 1.20 |
| Mixed Papers..... | .35 | " | .40 |
| Print Manila..... | .65 | " | .70 |
| Container Manila... | .60 | " | .70 |
| Old Newspapers.... | .60 | " | .65 |
| Paper Wool Strings.. | .90 | " | 1.00 |
| Overissue News..... | 1.00 | " | 1.10 |
| Box Board Chips.... | .50 | " | .52½ |
| Corrugated Boxes... | .55 | " | .65 |
| Kraft corrugated boxes | 1.05 | " | 1.15 |
| Screening Wrappers | .60 | " | .70 |

## Bagging

(f.o.b.Boston)

| | | | |
|---|---|---|---|
| Manila Rope— | | | |
| Foreign ..... | 5.00 | @ | — |

# TORONTO

## Paper

### Bonds

| | | | |
|---|---|---|---|
| Direct mill shipment in two-ton lots. | | | |
| No. 1 White .....$36.50 | | @ | — |
| No. 1 Tints ..... | 37.50 | " | — |
| No. 2 White ..... | 26.50 | " | — |
| No. 2 Tints ..... | 27.50 | " | — |
| No. 2 Golden Rod.. | 28.50 | " | — |
| No. 3 White ..... | 22.00 | " | — |
| No. 4 White ..... | 15.50 | " | — |
| No. 4 Tints ..... | 16.50 | " | — |
| No. 4 Golden Rod.. | 17.50 | " | — |
| Direct mill shipment in three-ton lots. | | | |
| No. 5 White .....$10.40 | | @ | — |
| No. 5 Tints ..... | 11.40 | " | — |
| No. 5 Golden Rod.. | 12.40 | " | — |
| No. 6 White ..... | 9.40 | " | — |
| No. 6 Tints ..... | 9.90 | " | — |
| No. 6 Golden Rod.. | 11.40 | " | — |
| No. 7 White ..... | 8.40 | " | — |
| No. 7 Tints ..... | 8.90 | " | — |
| No. 7 Golden Rod.. | 10.40 | " | — |
| Book— | | | |
| No. 1 M. F. ..... | $7.75 | " | — |
| No. 2 M. F. ..... | 7.25 | " | — |
| No. 3 M. F. ..... | 6.60 | " | — |
| No. 1 S. C. ..... | 8.25 | " | — |
| No. 2 S. C. ..... | 7.75 | " | — |
| No. 3 S. C. ..... | 6.25 | " | — |

## Coated Book & Litho

Ton Lots (resale)

| | | | |
|---|---|---|---|
| No. 1 .....$12.15 | | @ | — |
| No. 2 ..... | 10.50 | " | — |
| No. 3 ..... | 9.45 | " | — |
| Coated tinted..... | 13.20 | " | — |
| Golden Rod..... | 14.80 | " | — |
| Wrapping—delivered— | | | |
| Rag Brown..... | 4.85 | " | 5.25 |
| White Wrap..... | 4.00 | " | — |
| "B" Manila..... | 4.90 | " | 6.15 |
| No. 1 Manila.... | $5.50 | @ | $6.90 |
| Fiber ..... | 5.50 | " | 6.90 |
| Kraft No. 2..... | 5.50 | " | 6.90 |

(f.o.b. Cars, Toronto)

| | | | |
|---|---|---|---|
| News per ton— | | | |
| Rolls (contract).. | 46.00 | " | — |
| Sheets ..... | 54.00 | " | — |

## Pulp

| | | | |
|---|---|---|---|
| Ground wood.....$36.50 | | @ | — |
| Unbleached sulphite. | 54.00 | " | — |
| Bleached sulphite... | 64.00 | " | — |
| Kraft ..... | 47.50 | " | — |
| Soda ..... | 58.00 | " | — |

## Old Waste Paper

(In carload lots, f.o.b. Toronto)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| White Env. Cut.. | 2.15 | @ | — |
| Soft White..... | 2.00 | " | 2.15 |
| White Blk. News.. | 1.35 | " | 1.50 |
| Book and Ledger— | | | |
| Flat Magazine and Book Stock (old) | .90 | " | 1.00 |
| Light and Crumpled Book Stock..... | .80 | " | .90 |
| Ledgers and Writings ..... | 1.15 | " | — |
| Manilas— | | | |
| New Manila Cut.. | 1.55 | " | 1.60 |
| Printed Manilas... | .70 | " | — |
| Kraft ..... | 1.15 | " | — |
| News and Scrap— | | | |
| Strictly Overissue | .75 | " | — |
| Strictly Folded .. | .70 | " | — |
| No. 1 Mixed Paper | .60 | " | — |

# CHICAGO

## Waste Paper

(f.o.b. Chicago)

| | | | |
|---|---|---|---|
| Shavings— | | | |
| No. 1 White Envelope cuttings.. | 2.40 | @ | — |
| No. 1 Hard White | 2.23 | " | — |
| No. 1 Soft White | 2.00 | " | — |
| Ledger and Writings | 1.20 | " | — |
| Solid Books..... | .95 | " | — |
| Blanks ..... | 1.70 | " | — |
| Krafts ..... | 1.00 | " | — |
| New Kraft Cuts..... | 1.60 | " | — |
| Overissue News..... | .80 | " | — |
| Old Newspapers— | | | |
| No. 1 Folded News | .73 | " | — |
| No. 1 Mixed Paper | .63 | " | — |
| Roofing Stocks— | | | |
| No. 1 ..... | 1.25 | @ | — |
| No. 2 ..... | 1.15 | " | — |